

## Effect of contextual interference on anxiety and achievement motivation in acquisition and retention of selected badminton skills

Melinaz Rahman Gholhaki<sup>1</sup>, Mohsen Akbarpour Beni<sup>2</sup>, Mahdi Fahimi<sup>4</sup>, Hamid Sadegheyani<sup>2</sup>, Ahmad Alimardani<sup>2</sup>

1. Department of Physical Education and Sport Sciences, Islamic Azad University, Branch of sciences and research, Tehran, Iran

2. Department of Physical Education and Sport Sciences, University of Qom, Qom, Iran,

4. Department of Physical Education and Sport Sciences, Ferdousi University, Mashhad, Iran

[akbarpour.mohsen@gmail.com](mailto:akbarpour.mohsen@gmail.com)

**Abstract: Objective:** The aim of this study was to investigate effect of the underlying psychological factors (anxiety and achievement motivation of selected badminton skills (Tass, high-service, back hand under hand clear). **Methods and Materials:** A total of 40 girls with a mean age of  $21 \pm 8 / 3$  randomly selected and divided into two groups of 20 persons. We used from questionnaires of Spielberg state- trait anxiety inventory and Edvard's achievement motivation for assessing of anxiety and achievement motivation, and for result of function we used from Pool's Long serve Test. The subjects practice skills in both blocked and random practice groups in 10 sessions of 90 minutes. Both groups at the end of a first session (pretest), tenth sessions (acquisition) and after 72 hours (retention) completed the questionnaires again. In order to analyze the results of the study, we used T-independent test and analysis of variance with repeated measures (ANOVA) with the index of Eta, and Greenhouse-Geiss, and T-dependent and according to p bonferroni, and to assess normal distribution from kolmogorov-smirnov test and Levene test for heterogeneity of variance was used. Software SPSS (ver 19) was employed to analyze data.  $P < 0.05$  was considered significant. **Results:** The results showed a significant difference between both groups from pre-test to acquisition and retention test ( $p = 0/001$ ). achievement motivation showed significant difference in blocked practice from pretest to acquisition test and retention test ( $p = 0/001$ ). While there were no significant difference from pretest to retention test ( $p = 0/021$ ). and there were significant difference in achievement motivation in random practice from pretest to retention test ( $p = 0/001$ ). While there were no significant difference from pretest to acquisition test ( $p = 0/02$ ). Also the results showed significant difference between means of performance in both groups in acquisition test ( $p = 0/05$ ) and retention test ( $p = 0/02$ ). **Conclusion:** At the basic of results of the study, in retention test, the anxiety and achievement motivation in random practice group decrease more than from blocked practice group. We can explain this result according to multi aspect theory of anxiety and theories of need and attribution in achievement motivation. Also volume of learning is increasing during random practice ratio blocked practice, that for explanation of this result, we can use from forgetting or spacing hypothesis.

[Melinaz Rahman Gholhaki, Mohsen Akbarpour Beni, Mahdi Fahimi, Hamid Sadegheyani, Ahmad Alimardani. **Effect of contextual interference on anxiety and achievement motivation in acquisition and retention of selected badminton skills.** *J Am Sci* 2012;8(12):630-636]. (ISSN: 1545-1003). <http://www.jofamericanscience.org>. 86

**Key word:** Contextual Interference, Anxiety, Achievement motivation, acquisition, retention Badminton skill

### Introduction

One of the questions that coaches during scheduling for teaching some skills in a session of training to meet with this question that with what sequence working out the participations so that they get better effectual situation and in as much as the most important factor of learning is exercise and training, so the coach should be adjusted planning of exercise according to the nature and terms of implementation skills. Accordingly, it has been shown that sequence variation in practice leads to better learning (Schmidt & Lee, 2005).

One of the approaches for variation practice is contextual interference. Battig (1997) used this word for naming interference, which arise from the exercising of a task in a position of training (Battig,

1979). In this case, both the blocked and random practice arrangement has been proposed. The blocked practice is a kind of molding practice, in that practice the skills repeated without interference of other tasks and all of the training attempts each skill, completed before start of training of next skill. In contrast, in random practice, there is not a predefined order in repeated. According to previous results of researches, the blocked practice result to sooner acquisition in training sessions, but the random practice had slower and durable acquisition. In addition, Magill and Hall (1990) stated that when the tasks control same with generalized motor program, the effect of contextual interference on learning generalized motor program and parameter does not happen (Magill & Hall, 1990). Despite carefulness in laboratory researches, and their

high validity, they should not forget that outside of the laboratory researches, is required to achieve practical results. Because of this reason the early studies to examine the contextual interference effect can generalize to functional areas, especially the exercise is done. Research results related to sports, full alignment with each other is not. For example Bartoli and colleagues showed that in the acquisition and retention skills of volleyball, the results of random practice group were better than blocking group (Bortoli, Robazza, Durigon, & Carra, 1992). In contrast, Cassio and Tani have failed to demonstrate the effect of contextual interference in the skill of throwing darts (CASSIO M MEIRA & Tani, 2001). From review of results of previous researches and comparing those with laboratory researches, is consider to the benefits of situation of contextual interference may depended on method and volume of variation in training session, a question and retention tests, the nature of tasks and level of skill of participation (Williams, 2004). On the other hand, success or failing in sport depend on more factors such as mental and social factors including anxiety, achievement motivation, goals, personality characters and so on, that all can effects quality of function and results of athlete. One of the variables that have closely relationship with sport function is anxiety, that have high effect in both of learning and athlete's performance areas. The Findings, suggest that anxiety have a negative impact on athlete's performance. Whatever the anxiety level be higher than optimal level, the performance of athletes during competition will be lower. Drive Theory and Inverted U Theory in this area are the oldest, have tried to correlate the function to arousal. The new hypotheses on the relationship between anxiety and performance are emphasized. One of these assumptions, consider the nature of state anxiety is multidimensional and hence, is called the theory of multidimensional state anxiety. The main point in this theory is that cognitive and physical stress has different effects on athletic performance. specifically we can be said that the cognitive Anxiety have negative linear relationship with function, while the physical anxiety associated with function as Inverted U. Catastrophe theory (Hardy, 1988) to describe the interaction between cognitive and physical anxiety and their combination relationship with performance. The predictions of catastrophe theory suggest that physical exercise is company with increasing the physical anxiety untills optimal level. When cognitive anxiety is low, the performance will continue well. Whenever a lot of physical anxiety, with high cognitive anxiety be compounded, will occur a severe reduction in performance level (catastrophic effects). The relationship between cognitive anxiety and

performance in this theory is also a negative linear relationship. The other important psychological factor that is effective in volume and intensity in athlete's performance is motivation. Motivation is a hypothetical construct that is used to describe the inner or outer forces, and intentions, direction, intensity and persistence of behavior makes (Schmidt & Lee, 2005). In fact the motivation is the main factor for efforts and strengthening to achieve the goals of human behavior is voluntary. The achievement motivation is one of the kinds of motivations that in sport psychology area is more important and is consider that achievement motivation effect on most of behaviors, thoughts, feelings including selection the kind of activities, effort for arriving to goals, perseverance in company with failing (Yoo & Kim, 2002). Athletes towards perfection, to deal with difficulties and obstacles that lie ahead are many, needs to the mental power. Motivation is the psychological underpinnings of this force. With due attention to the expected value of Atkinson (1964) three factors, motivation for success (Ms), the probability of success (Ps), and the incentive value of success (Is), determines a person's tendency to progress (Ts), that if  $(Ts) = (Ms) * (Ps) * (Is)$  are shown (Magill & Hall, 1990). Unierzyski (2003) made study with title of "Achievement Motivation levels of tennis players and their future progress". The subjects comprised two groups: Group A consists of 11 international tennis players and Group B consists of 174 tennis players below the international level. Results showed players of group A significantly higher achievement motivation than the players of Group B (Unierzyski, 2003). According to being rare new studies in issue of contextual interference and psychological factors such as anxiety and achievement motivation and this point that the psychological factors are accelerator motor of physical performance of athletes for acquisition required skills for arriving to successes and victory, the kind of methods of training likely cause producing positive and negative states in participations and may cause prevention or encouragement them from sport activities, so suitable programming for training different skills in one session is necessary. In as much as in often studies in this area only paid attention to cognitive aspect of contextual interference and didnot attention to mental aspects that may occur in this area, we tried to engage new view to psychological differences that may effect from this pattern.

The result of this study can be useful for coaches and athletes of Badminton and other athletes that they should exercise more skills in one session for scheduling trainings with regards to their psychological factors used to increasing motor learning and mental skills of participations.

## Materials and Methods

### Subjects

This study was conducted in Tehran, Iran during 2011-2012. The study took place in a badminton classes of sport clubs of tehran city that were girls 18-25years old. 1000 girls participated in elementary study, and then they were homogenized in demographic characters (i.e. social, economic, cultural characters, and live environment). From homogenized subjects, 40 subjects were randomly selected. In a pretest, 20 subjects were allocated by random matching to the each groups, Blocked practice and Random practice (Table1).

**Table 1: General Characters**

Groups	Age		weight		Hight	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Blocked practice	18.2	1.2	56.6	0.6	160.3	1.2
Random practice	18.3	1.1	55.9	0.7	158.7	1.1

### Instrumentation:

We used from questionnaires of Spielberg state-trait anxiety inventory and Edward's achievement motivation for assessing of anxiety and achievement motivation, and for result of function we used from Pool's Long serve Test.

### Intervention program:

The subjects practice skills in both blocked and random practice groups in 10 sessions of 90 minutes. Both groups at the end of a first session (pretest), tenth sessions (acquisition) and after 72 hours (retention) completed the questionnaires again.

The intervention program was an ten-sessions Badminton program. The length of each session was

90 minutes. Session took place Two days per week according to specific lesson plan. The Blocked and Random practice groups consisted of three sections: 1) warming up 2) main program and 3) cool down.

### Procedures:

This study has been confirmed by research council Department of Physical Education and Sport Sciences Islamic Azad University, branch of sciences and researches, Tehran, IR Iran. This study utilized a pretest and post test applying quasiexperimental design.

### Statistical methods:

In order to analyze the results of the study, we used T-independent test and analysis of variance with repeated measures (ANOVA) with the index of Eta, and Greenhouse-Geiss, and T-dependent and according to p bonferroni, and to assess normal distribution from kolmogorov-smirnov test and Levene test for heterogeneity of variance was used. Software SPSS (ver 19) was employed to analyze data.  $P < 0.05$  was considered significant.

The study protocol was approved by the Ethics Committee of Department of Physical Education and Sport Sciences, Islamic Azad University, branch of sciences and researches.

### Result

The test results of analysis of variance with repeated measured according to the modified method Greenhouse-Geiss(GG) on a three-step test show that the Eta index of anxiety within the block group were 0.687 and within the random group were 0.94 ( $P = 0.001$ ).

**Table 2: results of analysis of variance with repeated measured according to the Greenhouse-Geiss(GG)**

groups	Source	Sum of Squareds	df	Mean Square	F	p	Eta Squared
Blocked Practice	Between Groups	230.5	2	115.25	37.33	0.001	0.687
	Within Groups	136.5	19	8.03			
	Interaction	204.9	38	3.08			
	Total Sum	571.9	59				
Randomed Practice	Between Groups	1113.8	2	556.9	266.2	0.001	0.94
	Within Groups	67.82	19	3.9			
	Interaction	71.11	38	2.09			
	Total Sum	1252.73	59				

The results showed that random practice in comparing of blocked practice had greater reduction in anxiety in retention test and improved the performance. With using the post hoc paired tests (t dependent) and the P bonferroni, were observed significant differences within random and blocked practice groups from pre-test to the acquisition test and retention test. More exactly, anxiety levels in the random practice group in acquisition phase were more than the pre-test and in pretest were more than the retention test and the acquisition were more than retention test. In fact in the acquisition phase of anxiety in the random practice group had its lowest accident. Also in the blocked practice group, the anxiety in the acquisition were lower than pretest and in retention test were much greater than the pretest, as well as anxiety in the retention test was also higher than the acquisition test.

The test results of analysis of variance with repeated measured according to the modified method Greenhouse-Geiss (GG) on a three-step test showed the significant differences with the Eta index of achievement motivation within the block group were 0.714 ( $P < 0.05$ ) and within the random group were 0.994 ( $P = 0.001$ ).

**Table3: analysis of the post hoc paired tests (t dependent) and the P bonferroni**

Groups	Stages	Acquisition Test	Retention Test
Blocked Practice	Pretest	T = 30.84 P = 0.001	T = 8.79 P = 0.001
	Acquisition Test		T = -41.62 P = 0.001
Randomed Practice	Pretest	T = - 12.93 P = 0.001	T = 19.004 P = 0.001
	Acquisition Test		T = - 44.70 P = 0.001

**Table 4: results of analysis of variance with repeated measured according to the Greenhouse-Geiss(GG)**

groups	Source	Sum of Squareds	df	Mean Square	F	p	Eta Squared
Blocked Practice	Between Groups	8.90	2	4.45	42.47	0.001	0.714
	Within Groups	4.49	19	0.265			
	Interaction	3.56	38	0.105			
	Total Sum	16.95	59				
Randomed Practice	Between Groups	1486469.5	2	746264.7	2.8	0.001	0.994
	Within Groups	32661.5	19	1921.26			
	Interaction	9014.5	38	265.13			
	Total Sum	1548125.5	59				

With using the post hoc paired tests (t dependent) and the P bonferroni, were observed significant differences within blocked practice group from pre-test to the acquisition test and retention test. Achievement motivation levels in acquisition phase were more than the pre-test and retention test, while from pretest to retention test had not any significant difference. Also in the randomed practice group, the achievement motivation in the acquisition were significant difference from pretest to retention test, while from pretest to retention test had not any significant difference. So that the from pre-test to the retention test, and also the acquisition test to the retention tests the difference was significant. Also significant differences in achievement motivation between blocked and random groups in the acquisition and retention test was observed (P = 0.001).

**Table 5: analysis of the post hoc paired tests (t dependent) and the P bonferroni**

Groups	Stages	Acquisition Test	Retention Test
Blocked Practice	Pretest	T = - 9.10 P = 0.001	T = 5.80 P = 0.06
	Acquisition Test		T = 8.06 P = 0.001
Random Practice	Pretest	T = 2.97 P = 0.06	T = - 6.94 P = 0.001
	Acquisition Test		T = - 4.48 P = 0.001

The results showed that the level of achievement motivation in random practice group in

retention test were more than the other stages in the same group and blocked practice group. Also the results show that between the averages of performance in the both blocked and random practice groups were significant differences in retention test. (Using t-test was shown between the test groups significant difference exists). According to the more differences in random practice group with 95% confidence we can concluded that the contextual interference has a significant impact on learning and occurred the better performance in the retention of the random practice group.

### Discussion

The results showed that random practice in comparing to blocked practice caused greater reduction in anxiety in retention test and improved performance. also the level of achievement motivation in a random group in the retention was greater than of other stages in the same group and blocked group. And we can be concluded that the contextual interference has a significant impact on learning. And cause better performance in random group in the retention test. the results of acquisition test is similar to the findings of Fouladian and et al (2009), Shea and Morgan (1979), shea and Zimani (1983), Lee and Magil (1983,1985), and Boyce and del Rey (1990), Sekiya and et al (1996,1994), shea and colleagues (2001), Maslow (2004), Keller and Et al (2006) (Boyce & Del Rey, 1990; Fooladian, Namazizadeh, Sheikh, & Bagherzadeh, 2009; Keller, Li, Weiss, &



Relyea, 2006; Lee & Magill, 1983, 1985; Sekiya, Magill, & Anderson, 1996; Sekiya, Magill, Sidaway, & Anderson, 1994; C. H. Shea, Lai, Wright, Immink, & Black, 2001; J. B. Shea & Morgan, 1979; J. B. Shea & Zimny, 1983).

They concluded in their study that in the acquisition phase, significant differences between the groups Blocked and random and on the other hand contextual interference causes better performance. On the other hand, the results of current research is not similar with findings of Goode and Magil (1986) and Liversberg (1991)(Kitsantas, Zimmerman, & Cleary, 2000; Young, Cohen, & Husak, 1993). They in their research, between the method of performance of Blocked and random groups in acquisition phase did not observe any difference. This difference may be rooted in the nature of the task, the desired skills, sample size, duration of intervention, level of skill participations, individual differences in terms of physical, psychological, personality and other social conditions that have occurred accidentally during the training sessions(Fireman, Kose, & Solomon, 2003; Kitsantas, et al., 2000). They believe that the effect of contextual interference in random retention is visible. But Babvo (2008) demonstrated between the groups, there is no significant difference in random retention. This contradiction is probably influenced by skill's level of participation and the number of attempts has been. Number of efforts that had been used in research of Babvo was 540 attempts, which for a simple task is many. According to Babvo opinion, in such cases probably over learning, will obscure the effects of the workout arrangement. Also, his subjects were selected from among students, according to skill level and proven in elite athletes, it can also affect the important reasons is the lack of consistent results(Kokaridas, Natsis, Makropoulos, Xatzigeorgiadis, & Karpathakis, 2005). Among Research carried out in the field of contextual interference, often too much interference (random practice) versus low (blocked practice) were studied that in more than of them the results of shea and Morgan has been approved by their results(Fooladian, et al., 2009).Although there are disagreements between researchers, Overall, this point that the contextual interference in motor learning is effective is not rejected. Despite the large overlap in the acquisition phase, often causing loss runs, but ultimately the large interference as a effective factor in facilitating their learning motor skills. Similarity of training tasks and volume interference in the planning of this exercise is characterized of this practice. Based on approach of Atkinson (1996) can say the successful athletes, because success in various sports competitive have high achievement motivation.

Also findings showed statistically significant differences between achievement motivation of

successful and unsuccessful athletes. On the other hand the achievement motivation for successful athletes is significantly higher than of unsuccessful athletes. thus These findings is consistent with Vaterberg (1998), Gill (1993), Nerizesky (2003), that respectively showed the achievement motivation of hockey expert players is more than from amateur and recreational hockey players and achievement motivation of international tennis players is more than from lower-class players. On the strength of results of kokaridas and et al (2005) believed that respectively athletics approach of individuals is related to their approach from themselves as a athlete and achievement motivation in sport with experiments of athletes(Daniels, Sincharoen, & Leaper, 2005; Kokaridas, et al., 2005). In other words, people who know the results achievable, even if it is very difficult to achieve those results, they are still trying to get more work and effort, successful athletes and the difference in achievement motivation failed to justify(Lin, Wu, Udompholkul, & Knowlton, 2010). Feeling merits of doing tasks is the most important motivational variable that increases the achievement motivation. Henin (1980) and Crown (1993) a significant negative relationship between anxiety and athletic performance achieved. Also Kelaura (1987) in this context, examines the basketball players. He concluded that all players have exhibited the best performance under conditions of moderate anxiety. Hantoon and et al (2004) showed a significant negative relationship between anxiety and athletic performance was obtained. In this regard, sunstrom and Bernardo (2007) on the basketball players, a study conducted. It was found that under conditions of moderate anxiety in the players, to show their best performance.

In this study was observed a group who were randomized to practice in the acquisition test due to poor results and unexpected, they increased anxiety, and subsequently the results were weaker and their motivation to continuing, were significantly redacted. While this results for blocked group was contrast. After 72 hours, while the random practice group expects a very undesirable result of their own, after training, with observing their results, their state of anxiety decreased, and again get their confidence and thus their achievement motivation improved and they grew eager to continue the exercises were not willing to leave the hall. However, we saw the reverse results in blocked practice group. First they had high self-confidence but with seeing thier results, they stop the practice and with high anxiety attributed their week results to environmental factors. Maybe can explanation these results with using of multiaspects of anxiety theory, when the anxiety increasing from optimal level, subsequently cause negative impact on

performance, and the level of performance decreases. For better understanding of the reason of better results in random practice group than Blocked practice group, we can mention to forgetting theory or spacing hypothesis and learning more distinct and significantly (Biçer, Asghari, Kharazi, & Asl, 2012; J. B. Shea & Zimny, 1983). So maybe can results as random practice not only cause improvement of learning in retention test but according to results cause decreasing anxiety that is one of the important factors in getting results and more concentration and better learning, and also increasing achievement motivation to continuing training of individual to reach the professional level. Also talented individual that after incorrect training and with seeing first undesirable results their anxiety increased and get week results, after comparing their efforts and results with the other activities and results, they leave the exercise and the exercises were resigned to the thought of what the physical condition and mental condition and the individual are not extremely talented. It can be concluded at the end of study, the anxiety and achievement motivation in the random practice group significantly decreased at the retention test. Also learning rate during exercise as well as randomly than the training blocked exercise was increased to a greater extent. That perhaps for explanation of this result we mention to forgetting theory or spacing hypothesis that the individual should with help of Retrieval practice make new solution and the required information retrieved from long term memory.

### Conclusion

At the basic of results of the study, in retention test, the anxiety and achievement motivation in random practice group decrease more than from blocked practice group. We can explain this result according to multi aspect theory of anxiety and theories of need and attribution in achievement motivation. Also volume of learning is increasing during random practice ratio blocked practice, that for explanation of this result, we can use from forgetting or spacing hypothesis.

### Acknowledgment

The authors' greatly acknowledge the support of this work from Department of Physical Education and sport sciences of Islamic Azad university, Branch of sciences and researches. They also wish to thank the teachers and children who helped us in this project.

**Corresponding Author:** Mohsen. Akbarpour, Department of Physical Education, University of Qom, Qom, IRAN,

Email: akbarpour.mohsen@gmail.com; +989131839198

### References

1. Battig, W. F. (1979). The flexibility of human memory. *Levels of processing in human memory*, 23-44.
2. Biçer, S., Asghari, A., Kharazi, P., & Asl, N. (2012). The effect of exercise on depression and anxiety of students. *Annals of Biological Research*, 3(1), 270-274.
3. Bortoli, L., Robazza, C., Durigon, V., & Carra, C. (1992). Effects of contextual interference on learning technical sports skills. *Perceptual and Motor Skills*, 75(2), 555-562.
4. Boyce, B., & Del Rey, P. (1990). Designing applied research in a naturalistic setting using a contextual interference paradigm. *Journal of Human Movement Studies*, 18(4), 189-200.
5. CASSIO M MEIRA, J., & Tani, G. (2001). The contextual interference effect in acquisition of dart-throwing skill tested on a transfer test with extended trials. *Perceptual and Motor Skills*, 92(3), 910-918.
6. Daniels, E., Sincharoen, S., & Leaper, C. (2005). The relation between sport orientations and athletic identity among adolescent girl and boy athletes. *Journal of Sport Behavior*, 28(4), 315.
7. Fireman, G., Kose, G., & Solomon, M. J. (2003). Self-observation and learning: The effect of watching oneself on problem solving performance. *Cognitive Development*, 18(3), 339-354.
8. Fooladian, J., Namazizadeh, M., Sheikh, M., & Bagherzadeh, F. (2009). The Effect of Practice Arrangement (Contextual Interference) on Acquisition, Retention and Transfer of Generalized Motor Program and Parameter. *World*, 2(1), 53-59.
9. Keller, G. J., Li, Y., Weiss, L. W., & Relyea, G. E. (2006). CONTEXTUAL INTERFERENCE EFFECT ON ACQUISITION AND RETENTION OF PISTOL-SHOOTING SKILLS 1, 2. *Perceptual and Motor Skills*, 103(1), 241-252.
10. Kitsantas, A., Zimmerman, B. J., & Cleary, T. (2000). The role of observation and emulation in the development of athletic self-regulation. *Journal of Educational Psychology*, 92(4), 811.
11. Kokaridas, D., Natsis, P., Makropoulos, K., Xatzigeorgiadis, A., & Karpathakis, N. (2005). SPORT ORIENTATION AND ATHLETIC IDENTITY OF PARALYMPIC GAMES'SHOOTERS. *Inquiries in Sport & Physical Education*, 3, 98-106.
12. Lee, T. D., & Magill, R. A. (1983). The locus of contextual interference in motor-skill acquisition.

- Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9(4), 730.
13. Lee, T. D., & Magill, R. A. (1985). Can forgetting facilitate skill acquisition. *Differing perspectives in motor learning, memory, and control*, 3-22.
  14. Lin, C. H. J., Wu, A. D., Udompholkul, P., & Knowlton, B. J. (2010). Contextual interference effects in sequence learning for young and older adults. *Psychology and aging*, 25(4), 929.
  15. Magill, R. A., & Hall, K. G. (1990). A review of the contextual interference effect in motor skill acquisition. *Human movement science*, 9(3), 241-289.
  16. Schmidt, R. A., & Lee, T. D. (2005). *Motor control and learning: A behavioral emphasis*: Human Kinetics Publishers.
  17. Sekiya, H., Magill, R., & Anderson, D. (1996). The contextual interference effect in parameter modifications of the same generalized motor program. *Research quarterly for exercise and sport*, 67(1), 59.
  18. Sekiya, H., Magill, R., Sidaway, B., & Anderson, D. (1994). The contextual interference effect for skill variations from the same and different generalized motor programs. *Research quarterly for exercise and sport*, 65(4), 330-338.
  19. Shea, C. H., Lai, Q., Wright, D. L., Immink, M., & Black, C. (2001). Consistent and variable practice conditions: effects on relative and absolute timing. *Journal of motor behavior*, 33(2), 139-152.
  20. Shea, J. B., & Morgan, R. L. (1979). Contextual interference effects on the acquisition, retention, and transfer of a motor skill. *Journal of Experimental Psychology: Human Learning and Memory*, 5(2), 179.
  21. Shea, J. B., & Zimny, S. T. (1983). Context effects in memory and learning movement information. *Advances in Psychology*, 12, 345-366.
  22. Unierzyski, P. (2003). Level of achievement motivation of young tennis players and their future progress. *Journal of Sports Science and Medicine*, 2, 184-186.
  23. Williams, M. (2004). *Skill acquisition in sport: Research, theory and practice*: Routledge.
  24. Yoo, J., & Kim, B. J. (2002). YOUNG KOREAN ATHLETES' GOAL ORIENTATION AND SOURCES OF ENJOYMENT. *Perceptual and Motor Skills*, 94(3), 1043-1049.
  25. Young, D., Cohen, M., & Husak, W. (1993). Contextual interference and motor skill acquisition: On the processes that influence retention. *Human movement science*, 12(5), 577-600.

11/22/2012