©Journal of Sports Science and Medicine (2008) **7,** 371-378
http://www.jssm.org

Research article

The effect of different corrective feedback methods on the outcome and self confidence of young athletes

George Tzetzis [1]✉, Evandros Votsis [1] and Thomas Kourtessis [2]
[1] Department of Physical Education and Sport Science, Aristotelian University of Thessaloniki, Greece
[2] Department of Physical Education and Sport Science, Democritus University of Thrace, Greece

Abstract

This experiment investigated the effects of three corrective feedback methods, using different combinations of correction, or error cues and positive feedback for learning two badminton skills with different difficulty (forehand clear – low difficulty, backhand clear – high difficulty). Outcome and self-confidence scores were used as dependent variables. The 48 participants were randomly assigned into four groups. Group A received correction cues and positive feedback. Group B received cues on errors of execution. Group C received positive feedback, correction cues and error cues. Group D was the control group. A pre, post and a retention test was conducted. A three way analysis of variance ANOVA (4 groups X 2 task difficulty X 3 measures) with repeated measures on the last factor revealed significant interactions for each depended variable. All the corrective feedback methods groups, increased their outcome scores over time for the easy skill, but only groups A and C for the difficult skill. Groups A and B had significantly better outcome scores than group C and the control group for the easy skill on the retention test. However, for the difficult skill, group C was better than groups A, B and D. The self confidence scores of groups A and C improved over time for the easy skill but not for group B and D. Again, for the difficult skill, only group C improved over time. Finally a regression analysis depicted that the improvement in performance predicted a proportion of the improvement in self confidence for both the easy and the difficult skill. It was concluded that when young athletes are taught skills of different difficulty, different type of instruction, might be more appropriate in order to improve outcome and self confidence. A more integrated approach on teaching will assist coaches or physical education teachers to be more efficient and effective.

Key words: Instructional cues, badminton skills, difficulty.

Introduction

Effective instruction may be crucial to the pursuit of optimal sporting performance. The most significant role of the physical education teacher or the coach is to give information about the skills' execution in the form of feedback (Hodges and Franks, 2002) and has been found to be a key tool in improving and learning motor skills (Schmidt and Wrisberg, 2004). According to the cognitive approach the role of instructions and criticism on performance is a crucial factor for learning (Wulf and Shea, 2004) however, the ecological (Gibson, 1979) and dynamical systems approach (Kelso, 1981; Stergiou, Harbourne and Cavanaugh, 2006) of performance and learning support that information about the movement from an external source feedback is a second order constraint.

Children begin to form impressions about their own self-worth based on the types of experiences they have and the nature of the feedback they get about their performance. If children are to feel competent, teachers must give them appropriate information about their performance. It is not enough merely to praise them for trying. Teachers must be selective in providing reinforcement and be certain that the behaviour of a child is appropriate for a particular reinforcement. Many researchers attempted to find the most appropriate methods of providing information through feedback to refine and develop motor skills (Salmoni et al., 1984). It is important to realize that this information can be acquired through many different methods, not all of which are as effective as each other (Amorose and Weiss 1998; Williams and Hodges, 2005). Providing feedback in the form of verbal cueing facilitates the performance of the task by verbally indicating vital form characteristics (Landin, 1996), enhances attention and provides additional information that may not be available through visual observation. (Janelle et al., 2003). Lee et al. (1993) suggested that instructors' feedback is typically verbal and in the form of positive, non-specific evaluative statements. Providing verbal cues about errors and corrections is useful for learners especially for the beginners (Kernodle and Carlton 1992). The provision of encouragement with feedback that will help improve a skill (corrective feedback or criticism) may help the child improve and also believe the idea that the child can do better and improve the self confidence.

However, less is known about the effectiveness of feedback in skills of different difficulty level (More and Franks, 1996; Hughes and Franks, 1997). Kernodle and Carlton (1992) supported that when feedback provided contains error and correction cues is more useful for the difficult tasks. Schmidt and Lee (1998) proposed that more research is needed for examining the relation of skills' difficulty with feedback effectiveness.

A mediating factor between the presentation of the instructions by the coach and the performance of the skill by the player might be the cognitive process of self confidence (Escarti and Guzman, 1999). The most powerful

Received: 19 February 2008 / Accepted: 01 July 2008 / Published (online): 01 September 2008

source of self-confidence is mastery of a skill (Bandura, 1977; 1997; Harter, 1978; Vealey et al., 1998). Allen and Howe (1998) showed that self-confidence of the athletes is determined by coach feedback. Feedback can be accepted as a reward when there is a correct execution and this may increase self confidence levels or as a criticism when errors of the execution are corrected and the level of self confidence is decreased. Smith et al. (1995) asserted that feedback either in the form of error correction or in the form of praise and criticism can have a significant effect on young athletes' psychology and self confidence. Feltz (1988) argued that it is still not clear whether the guidance and feedback of a coach can have an effect on an athlete's self-confidence. Lyster and Ranta (1997) attempted to find what types of error treatments encourage learners and the results have been found to be quite complicated. Research on instructor feedback and student uptake does not yield conclusive claims and more research is needed.

Many researchers investigated different methods of instruction that improve learning in laboratory settings (Vickers et al., 1999) in classroom settings (Scheeler and Lee, 2002) or in applied settings (Goode and Magill, 1986) However, there is not much empirical evidence for the effect of instructors' corrective feedback on skills' learning and self confidence for different type of skills (Franks, 1997; Hughes and Franks, 1997; More and Franks, 1996) including sport related cognitive complex solving tasks (McCullagh and Little, 1990; Sanchez and Bambouras, 2006; Silverman, 1994). Rink et al. (1996) proposed that the lack of empirical evidence to support any one approach to the teaching-learning process over another precludes the efficacy of suggesting a 'model' profile for coaches' pedagogical content interventions. It is important for coaches to know how these different sources of feedback work both alone and in conjunction with other instructional techniques to improve learning of different complexity skills. Scheeler et al. (2004) mentioned that determining and interpreting the impact that different types of feedback have on performance has been difficult because there are number of complex theoretical processes of mechanisms involved. Williams and Hodges (2005) added that it might need further study before a complete understanding of its nature and significance is possible. Bunker (1991) suggested that children acquire self-confidence and self-esteem as a result of successful experience.

This experiment was designed to investigate how different types of corrective feedback (positive and correction cues, error cues or a combination) improve learning of a skill and alter self confidence of the participants. An additional purpose was to investigate whether these corrective feedback methods have the same effects in easy or difficult skills. In previous experiments (Tzetzis and Votsis, 2006), the effect of feedback may have been confounded with the level of difficulty of the skills, thus this experiment manipulates the level of difficulty to see whether feedback differentially affects outcome and self confidence when the skill difficulty varies. The purpose was to investigate the effect of three different treatment conditions (corrective feedback), the effect of time and the effect of difficulty level as well as their interaction on retention of the outcome and self-confidence, of two badminton skills with different difficulty level, for youth participants. The relationship of the participants' self confidence by their outcome scores was also investigated. Since participants are novices and corrective feedback as well as error identification feedback are both necessary in directing, correcting and motivating them in practice, it was hypothesized that the combined method of positive feedback and instructional cues on execution as well as error cues would have the best results, improving the outcome and self confidence scores of both skills, across time.

Methods

Subjects

The participants of the study were 48 young athletes, all boys, 10-14 years of age (M = 12.6, SD = 0.5), with 2-3 years practice experience (M = 2.6, SD = 0.2). This group of athletes was selected so as to be able to execute the fundamental badminton skills. They were randomly assigned into four equal ability groups. A (M = 12.3, SD = 0.6), B (M = 12.8, SD = 0.4), C (M = 12.7, SD = 0.4) and D (M = 12.5, SD = 0.5). Groups A, B and C followed different instructions and group D was the control group. The protocol for human subjects was approved according to the relevant laws and regulations of the country and institution, and participants signed an informed consent form.

Description of the skills

The two skills were: a) forehand-clear: a high return stroke on the dominant side of the body that carries the shuttlecock deep in to the backcourt (low difficulty) and b) backhand-clear: a high return stroke on the no dominant side of the body that carries the shuttlecock deep in to the backcourt (high difficulty). The two badminton skills were categorised as low difficulty (forehand-clear) and high difficulty (backhand-clear) according to the participation of the number of muscles, the co-ordination of muscles and joints and the experience of the athletes on them (Grice, 1996). Difficulty was operationally defined in terms of the level of technique combined with physical factors such as strength and power that would be required to perform the skill. Adding characteristics such as elevations, rotations, isolation and weight shift increased the difficulty level of a skill (Poon and Rodgers, 2000). Backhand clear is more difficult than the forehand-clear since the player does not have a vision of the playing court, and turns the body to the cross side of the target area so that aiming and depth perception is much more difficult. Also the follow through is not as big as the follow through of the forehand clear since the joints and muscles stop the movement and the athlete has to put much more power to direct the shuttlecock on the target area.

Procedures

All participants were pre-tested with the Poole and Nelson (1993) badminton test as depicted in Figure 1 on the two badminton skills with different difficulty and their mean scores were not significantly different.

The participants were also tested on a self-confi-

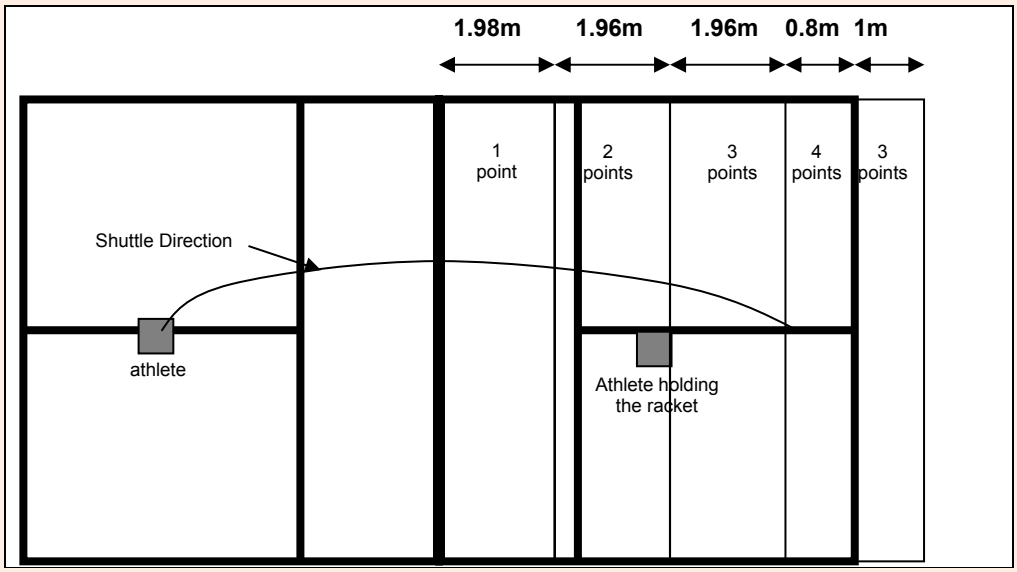

Figure 1. **Setting of the test for the forehand-clear and backhand-clear skills.**

dence test (Vealey, 1986) for each skill. There was a pre test before the implementation of the feedback methods, an acquisition test 12 weeks after the implementation of the instructional methods and a retention test 2 weeks later. In the beginning of every training session a demonstration was performed by an elite player. The instructor answered any questions about the technique of the two badminton skills. The three experimental groups practised and received instruction 2 times a week, executing 10 exercises (Grice, 1996) on each skill and every exercise lasted 4 min. The instructor gave corrective feedback, approximately 10 times on each badminton skill, in every training session. Before the main part of the practice there was 10 min warming-up and 10 min rest period after the practice. During the training program there was a video camera placed at a distance of 6m and an ankle of 45^{o} that recorded the performance of the athletes and was used to evaluate the outcome of the badminton skills tests.

The control group did not follow the practice. They participated only on the pre, post and retention tests. The three experimental groups followed the practice from the same coach but they were instructed according to the three different methods of corrective feedback. The first group (A) received positive feedback and instructional cues on how to correct the technique. The second group (B) received no positive feedback but instructional cues on errors of the execution. The third group (C) was a combined method and the participants received positive feedback and instructional cues on errors and directions on how to correct them. The instructors provided the participants summary feedback, every five trials, according to a written list of possible errors.

Badminton test

The purpose of the test (Poole and Nelson, 1993) was to measure the participants' performance ability executing the forehand-clear and the backhand-clear skills. The one side of the badminton court was separated into 4 parts (See Figure 1). An athlete was standing close to the last line of the opposite side of the court. He threw and hit the shuttle using the forehand-clear or the backhand-clear technique. Another athlete was standing on the other side in the middle of the half court (3.35m) holding the racket high (total high: 2.30m). The shuttle should pass over the net and the athlete's racket. The score depended on the point that the shuttle was landed. The athlete performed 12 shots, out of which the 10 best counted. The test retest reliability coefficient was satisfactory ($\alpha = 0.90$).

Self confidence test

The State Sport Confidence Inventory - SSCI (Vealey, 1986) was used to evaluate self-confidence of the participants. The inventory was administered prior to each testing situation in order to assess the athletes' degree of confidence that they would be successful in that sport. Each item was measured on a 1 (*low*) to 9 (*high*) point Likert scale. The SSCI demonstrated good internal consistency, $r = .95$, and adequate concurrent validity, $r = .64$. The participants completed the questionnaire prior to the start of their testing.

Training of the instructor

The instructor was a certified coach. Prior to introducing the training programs, specific written directions were given to the instructor on how to implement the instructional methods. The motor program errors were correcting first and the parameter errors later (Magill, 1993) from a list of possible errors constructed according to the bibliography (Grice, 1996). A pilot test with another group before the test assured the understanding and the correct implementation of the methods by the instructor.

Statistical analysis

The independent variables were the different feedback groups (A, B, C and D), the levels of the skills difficulty (low and high) and the measurement periods (pre, post and retention). The dependent variables were the outcome and self confidence scores. Two three-way 4(Groups) X 2

(Difficulty) X 3 (Measures) analysis of variance with repeated measures on the last factor was applied, for the outcome and self confidence scores of each skill. Whenever a significant F ratio obtained a Scheffé post hoc test with a Bonferroni adjustment was applied to assess multiple comparisons of mean differences. Finally a regression analysis was conducted to determine the prediction of self confidence by the outcome. The data were analysed using the S.P.S.S. (15 ed.) package.

Results

Two separate one-way ANOVAs' indicated that there were no initial differences (means and standard deviations in Table 1) of the pre-test scores for the four groups of low ($F_{2,45} = 2.85$, $p > 0.05$) or high difficulty skill ($F_{2,45} = 0.53$, $p > 0.05$).

Outcome

Effect group

According to what was hypothesized providing both positive feedback and error cues (group C) improved more the outcome scores for the difficult skill. However, contrary to what was hypothesized it was found that providing positive feedback and correcting cues (group A) or error cues (group B) improved more the easy skill than group C (the combined feedback). There was a significant main effect ($F_{2,45} = 65.163$, $p < 0.05$) for the outcome scores for the low difficulty skill at the retention test. The Scheffé post hoc analysis revealed that the group A and the group B were better than the group C or the control group. Contrary, for the difficult skill, the Scheffé post hoc analysis indicated that the group C was better than the groups A, B and the control group.

Effect measurement periods

Additional to the combined group (C) that was hypothesized, the positive feedback group improved outcome scores but not group (B). There was a significant main effect for the outcome scores for the low ($F_{2,45} = 3.685$, $p < 0.05$) and the high difficulty level skill ($F_{2,45} = 41.969$, $p < 0.05$) across the measurement periods. The Scheffé post hoc analysis revealed that all groups improved mean scores from pre to post and retention test for both skills except group (B) that received only error cues for the difficult skill or the control group.

Interaction of groups and difficulty level

The improvement of the outcome scores was different for the groups and the skill level and a significant interaction ($F_{4,90} = 13.04$, $p < 0.05$) was found among the outcome scores for different measurement times and groups for the different difficulty skills (summary of the result in Table 2).

Self confidence

Effect Group

According to what was hypothesized, providing both positive feedback and error cues (group C) improved more the self confidence scores for both the easy and the difficult skills. However, it was found that group (A) improved also the self confidence scores for the easy skill. There was a significant main effect ($F_{2,45} = 27.323$, $p < 0.05$) among the retention scores of the groups. A Scheffé

Table 1. Descriptive statistics of the outcome and self confidence scores.

Group & Difficulty	Measure	Performance outcome			Self confidence scores		
		M	SD	Range	M	SD	Range
Group A Correction Cue							
Forehand Clear	Pretest	31.93	3.23	30-35	5.48	0.54	4-6
	Posttest	37.81	1.27	35-40	8.64	0.69	5-9
	Retention	37.50	1.03	34-39	8.33	0.72	6-9
Backhand Clear	Pretest	16.75	1.34	14-18	5.09	0.88	3-7
	Posttest	23.06	1.12	20-25	5.65	0.74	3-7
	Retention	22.50	1.09	20-25	5.63	0.71	3-7
Group B Error Cue							
Forehand Clear	Pretest	32.75	2.69	29-34	5.60	0.73	4-6
	Posttest	38.18	0.98	35-38	6.20	0.43	4-7
	Retention	37.56	1.09	34-38	6.15	0.41	4-8
Backhand Clear	Pretest	15.90	1.02	13-17	4.81	0.59	3-7
	Posttest	21.85	1.16	19-25	5.14	0.57	3-8
	Retention	21.31	2.02	19-24	5.05	0.51	3-8
Group C Error + Correction Cue							
Forehand Clear	Pretest	30.50	1.21	27-34	4.93	0.69	3-8
	Posttest	34.37	0.71	29-37	8.65	0.52	6-9
	Retention	34.00	0.89	30-37	8.49	0.56	5-9
Backhand Clear	Pretest	16.00	1.31	14-18	4.88	0.63	3-6
	Posttest	27.50	1.71	24-29	7.59	0.65	4-9
	Retention	26.75	2.08	25-29	7.50	0.61	4-9
Group D Control Group							
Forehand Clear	Pretest	32.10	1.32	28-33	5.32	0.58	4-6
	Posttest	32.50	0.84	29-34	5.44	0.64	4-7
	Retention	32.43	1.06	29-33	5.38	0.49	4-6
Backhand Clear	Pretest	16.55	1.46	13-17	4.93	0.61	3-6
	Posttest	16.80	1.82	13-18	5.06	0.67	3-7
	Retention	16.69	1.33	14-18	4.98	0.59	3-6

post hoc analysis at retention for the easy skill showed that group (A) receiving positive feedback and instructions on correct execution of performance and group (C) receiving the combined feedback information were significantly better than group (B) that receiving error cues or the control group (D). Contrary, for the difficult skill at retention, only the group (C) receiving both positive feedback, correction and error cues was significantly better than the other three groups.

Table 2. Comparisons of all outcome group means and skills for three measurement periods.

Group & Difficulty	Group*		M_{diff}	p†
Pretest				
Forehand Clear	1	2	-.82	.68
	1	3	1.43	.31
	1	4	-.17	.54
	2	3	2.25	.25
	2	4	.65	.62
	3	4	-1.60	.30
Backhand Clear	1	2	.85	.61
	1	3	.75	.70
	1	4	.20	.79
	2	3	-.10	.83
	2	4	-.65	.64
	3	4	-.55	.66
Posttest				
Forehand Clear	1	2	-.37	.77
	1	3	3.44*	.012
	1	4	5.31*	.000
	2	3	3.81*	.010
	2	4	5.68*	.000
	3	4	1.87	.13
Backhand Clear	1	2	1.21	.43
	1	3	-4.44*	.006
	1	4	6.26*	.000
	2	3	-5.65*	.001
	2	4	5.05*	.001
	3	4	10.7*	.000
Retention				
Forehand Clear	1	2	-0.06	.82
	1	3	3.50*	.014
	1	4	5.07*	.001
	2	3	3.56*	.011
	2	4	5.13*	.001
	3	4	1.57	.46
Backhand Clear	1	2	1.19	.57
	1	3	-4.25*	.008
	1	4	5.81*	.006
	2	3	-5.44*	.004
	2	4	4.62*	.007
	3	4	10.06*	.000

Abbreviations: **Group 1** = positive feedback and correct cues; **Group 2** = error cues; **Group 3** = positive feedback, correct and error cues; **Group 4** = control group.
* = significant mean difference, p<.05.
† = bonferroni correction.

Effect measurement periods

According to what was hypothesized, the combined group (C) improved the self confidence scores across time for both the easy and the difficult skill. Additionally, the positive feedback group (A) improved outcome scores across time only for the easy skill. Finally, group (B) did not improved outcome scores for any skill across time. There was a significant main effect for the self confidence scores for the low ($F_{2,45}$ = 57.492, p < 0.05) and the high difficulty level skill ($F_{2,45}$ = 25.359, p < 0.05) across the measurement periods. The Scheffé post hoc revealed that group (C) that receiving the combined feedback, correction and error cues, improved mean scores significantly from pre to post and retention test for both skills, group (A) that receiving positive feedback improved mean scores significantly through time only for the easy skill and the group (C) that receiving error cues or the control group (D) did not improved mean scores significantly in any skill.

Table 3. Comparisons of all self confidence group means and skills for three measurement times.

Group & Difficulty	Group*		M_{diff}	p†
Pretest				
Forehand Clear	1	2	-.12	.68
	1	3	.55	.34
	1	4	.16	.68
	2	3	.67	.29
	2	4	.28	.62
	3	4	-.39	.51
Backhand Clear	1	2	.28	.42
	1	3	.21	.46
	1	4	.16	.83
	2	3	-.07	.72
	2	4	-.12	.86
	3	4	-.05	.91
Posttest				
Forehand Clear	1	2	2.44*	.014
	1	3	-.01	.89
	1	4	.21	.81
	2	3	-2.45*	.014
	2	4	.76	.80
	3	4		
Backhand Clear	1	2	.51	.26
	1	3	-1.94*	.022
	1	4	.59	.25
	2	3	-2.45*	.018
	2	4	-.33	.31
	3	4	2.53*	.018
Retention				
Forehand Clear	1	2	2.18*	.016
	1	3	-.16	.78
	1	4	2.95*	.008
	2	3	-2.34*	.014
	2	4	.77	.21
	3	4	3.11*	.001
Backhand Clear	1	2	.58	.24
	1	3	-1.87*	.026
	1	4	.65	.22
	2	3	-2.45*	.028
	2	4	.07	.63
	3	4	2.52*	.27

Abbreviations: **Group 1** = positive feedback and correct cues; **Group 2** = error cues; **Group 3** = positive feedback, correct and error cues; **Group 4** = control group.
* = significant mean difference, p<.05.
† = bonferroni correction.

Interaction of groups and difficulty level

The improvement of the self confidence scores was different for the groups and the skill level and a significant interaction ($F_{4,90}$ = 11.78, p < 0.05) was found among the self confidence means for different measurement times and groups for the different difficulty skills (summary of the result in Table 3).

Relationship between outcome and self confidence

A regression analysis was conducted to investigate the proportion of the prediction of the participants' self confidence by their outcome scores. The outcome scores were entered as the independent variable and the self confidence scores as the depended variable. The outcome predicted a significant ($F_{(1,46)} = 4.016$, $p < 0.01$) proportion of the variance (16%) in the dependent variable for the easy skill and a significant ($F_{(1,46)} = 21.559$, $p < 0.01$) proportion of the variance (30.4%) for the difficult skill.

Discussion

This experiment was designed to investigate how different types of corrective feedback improve learning of a skill and alter self confidence of the participants. It was hypothesized that providing both positive feedback and error correction cues could improve outcome and self confidence scores, for easy and difficult skills, across time for youth participants. This study is limited by the testing of outcome scores through a specialized badminton field test and the testing of self confidence through a sport confidence inventory administered prior to the testing.

From the critical review of Salmoni Schmidt and Walter (1984) until the more recent studies (Wulf and Shea, 2004) the attempt was to shed new light on the role of feedback for motor learning and enrich the guidance hypothesis. The recommendations were to conduct research in more realistic conditions and test more complex skills. This research investigated the effectiveness of three methods of corrective feedback, on acquisition and retention of the outcome and self-confidence, for two fundamental badminton skills with different difficulty level. There was an attempt to provide a suitable basis for establishing principles and guidelines for improvement of the outcome of the execution and self-confidence.

From the findings of this research it can be concluded that different instructional models of corrective feedback can have a different effect on both outcome and self-confidence for skills with different difficulty. Similar results were found by other researchers (Williams and-Hodges, 2005, Wulf and Shea, 2004).

It was found that almost all groups improved their outcome scores over time except group that received only error cues for the difficult skill. It seems that information for corrections of errors is more important for difficult skills. Probably the adjustments required to facilitate performance on subsequent practice attempts for difficult skills may not be readily apparent and consequently both feedback types might be necessary especially with beginners or experienced younger athletes (Kernodle and Carlton 1992; Tzetzis et al., 2002).

The group that received error cues and the one received positive feedback and correction cues had better outcome scores than the group received both feedback types, for the easy skill. However, the opposite was the case for the difficult skill. It can be concluded that for the low difficulty skills, information concerning error correction, or identification, is enough for the improvement of the execution. Participants seemed to have the ability to know their errors or how to correct them. It seems that for relatively simple movements, feedback can either have a descriptive role, alerting the learner of the error committed, or a prescriptive role, informing the performer as to what to do to correct the error. Schmidt and Wulf (1997) asserted that very analytical and complicated instruction about correct responses and errors may be redundant and unnecessary for less difficulty skills. Kernodle et al. (2001) also suggested that when the difficulty of the execution is high, it is more useful for athletes to get information for both errors and their correction. The implication is that when the task to be learnt is easy descriptive or prescriptive feedback improves learning but when the task is fairly difficult, players may require a combination of both prescriptive and descriptive feedback to improve performance (Williams and Hodges 2005; Wulf et al., 1998).

It is also important to note that feedback assisted young athletes to learn and retain their performance, since there was no decrease of the outcome scores from the acquisition to the retention period. It seems that the use of this type of instruction had long learning effects on performance.

In this experiment it was investigated how the types of corrective feedback can alter self confidence and whether they interact with the difficulty level of the skills. Both groups that received positive and correction cues improved their self-confidence over time and were better than group that receiving only error cues for the easy skill. It might be assumed that positive feedback had a positive effect on athletes' self confidence. Pulford and Colman (1997) supported that if feedback is positive and show that the goal is being achieved confidence increases, whereas, if the feedback is negative, then confidence decreases (or remain stable if the feedback is disregarded, for example to protect self-esteem).

The self-confidence scores of the difficult skill improved over time but only for the group that received positive feedback, error and correction cues. This group had also better self confidence scores than the other two groups. It seems that in difficult skills, positive feedback must be combined with error and correction cues, because is perceived by the participants as supportive information that leads to self confidence improvement. It is concluded that the nature of the task is an important moderator of self confidence when young athletes learn new skills (Moritz et al., 2000). Bunker (1991) suggested that children acquire self-confidence as a result of successful experiences. This was found from the relationship of the outcome and self confidence scores. Badminton is a game that relies heavily on individual performance and players' confidence is vulnerable when they are unsuccessful. Matching challenges (tasks) to learners is useful in order to enhance their self confidence.

It seems that the type of the skill is a critical factor in determining the effectiveness and the appropriateness of the corrective feedback types. It was concluded that different instructional methods of corrective feedback could have beneficial effects in terms of the outcome and self-confidence. Tzetzis et al. (1999) and Tzetzis and Votsis (2006) found similar results and they suggested that the improvement of the performance depends on the content of information and the complexity of the skills.

Conclusion

The conclusions may be important for instructors concerning the use of corrective feedback and reward in skill learning. Instructions focusing on the correct cues or errors increase participants' performance of easy skills. Instructions should be addressed for both the correct and the errors of the execution of difficult skills. Positive feedback or correction cues increase self-confidence of easy skills but only the combination of error and correction cues increase self confidence of difficult skills. This study is limited by the feedback models used for semi-experienced participants in badminton. It is not appropriate to make any generalizations that go beyond the scope of this research. Since feedback plays a powerful role in guiding the performance future studies should view the interaction of feedback with factors such as the availability of intrinsic feedback, the learners' level of experience and the degree to which feedback influence psychological mood of the participants. It is clear that much research is needed if we want to come to a more complete understanding of the role of feedback in the learning process.

References

Allen, J.B. and Howe, B.L. (1998) Player ability, coach feedback and female adolescent athletes perceived competence and satisfaction. *Journal of Sport and Exercise Psychology* **20,** 280-299.

Amorose, J.A. and Weiss, R.M. (1998) Coaching feedback as a source of information about perceptions of ability: A developmental examination. *Journal of Sport and Exercise Psychology* **20,** 395-420.

Bandura, A. (1977) Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review* **84(2),** 191-215.

Bandura, A. (1997) Self-efficacy: The exercise of control. American *Journal of Health Promotion* **12,** 8-12.

Bunker, K.L. (1991) The role of play and motor skill development in building children's self-confidence and self-esteem. *The Elementary School Journal* **91(5),** 467-471.

Escarti, A. and Guzman, J.F. (1999) Effects of feedback on self-efficacy, performance and choice in an athletic task. *Journal of Applied Sport Psychology* **11,** 83-96.

Feltz, D. (1988) Self-confidence and sport performance. *Exercise and Sport Science Review* **16,** 423-457.

Franks, I.M. (1997) The use of feedback by coaches and players. In: *Science and football III.* Eds: Reilly, T., Bangsbo, J. and Hughes, M. London: E & FN Spon. 267-278.

Gibson, E.J. (1979) *The ecological approach to visual perception.* Boston: Houghton Mifflin.

Goode, S. and Magill A.R. (1986) Contextual Interference Effects in Learning Three Badminton Serves. *Research Quarterly for Exercise and Sport* **57(4),** 308-314.

Grice, T. (1996) *Badminton: Steps to success.* Champaign, IL: Human Kinetics.

Harter, S. (1978) Effecting motivation reconsidered: Toward a developmental model. *Human Development* **21,** 34-64.

Hodges, J.N. and Franks, M.I. (2002) Modelling coaching practice: The role of instruction and demonstration. *Journal of Sport Science* **20,** 793-811.

Hughes, M. and Franks, I.M. (1997) *Notational analysis in sport.* London: E & FN Spon.

Janelle, M.C., Champenoy, D.J., Coombes A. S. and Mousseau, B.M. (2003) Mechanisms of attentional cueing during observational learning to facilitate motor skill acquisition. *Journal of Sport Sciences* **21,** 825-838.

Kelso, J.A.S. (1981) On the oscillatory basis of movement. *Bulletin of the Psychonomic Society* **18,** 63.

Kernodle, M.W. and Carlton, L.G. (1992) Information feedback and the learning of multiple-degree-of-freedom activities. *Journal of Motor Behaviour* **24,** 187-196.

Kernodle, M.W., Johnson, R. and Arnold, D.R. (2001) Verbal instruction for correcting errors versus such instructions plus videotape replay on learning the overhead throw. *Perceptual and Motor Skills* **92,** 1039-1051.

Landin, D. (1996) The role of verbal cues in skill learning. *Quest* **46,** 299-313.

Lee, M. A., Keh, C.N. and Magill, A. R. (1993) Instructional effects of teacher feedback in physical education. *Journal of Teaching in Physical Education* **12,** 228-243.

Lyster, R. and Ranta, L. (1997) Corrective feedback and learner uptake: Negotiation of form in communicative classrooms. *Studies in Second Language Acquisition* **19,** 37-66.

Magill, R. A. (1993) *Motor Learning: Concepts and Applications*, Dubuque, IA: Brown and Benchmark.

McCullagh, P. and Little, W.S. (1990) Demonstration and knowledge of results in motor skill acquisition. *Perceptual and Motor Skills* **71,** 735-742.

More, K.G. and Franks, I.M. (1996) Analysis and modification of verbal coaching behaviour: the usefulness of a data-driven intervention strategy. *Journal of Sports Science* **14,** 523-543.

Moritz, S.E., Feltz, D.L., Fahrbach, K.R. and Mack, D.E. (2000) The relation of self-efficacy measures to sport performance: a meta-analytic review. *Research Quarterly for Exercise and Sport* **71(3),** 280-294.

Poole, J. and Nelson, J.K. (1993) Poole Forehand-Backhand Clear Test. In: *Assessing Sport Skills*. Champaign, IL: Human Kinetics.

Poon, P.L.P. and Rodgers, M.W. (2000) Learning and remembering strategies of novice and advanced jazz dancers for skill level appropriate dance routines. *Research Quarterly for Exercise and Sport* **71 (2),** 135-144.

Pulford, B.D. and Colman, A.M. (1997) Overconfidence: feedback and item difficulty effects. *Personality and Individual Differences* **23(1),** 125-133.

Rink, E.J., French, E.K. and Tjeerdsma, B. (1996) Foundations for the learning and instruction of sport and games. *Journal of Teaching in Physical Education* **15,** 399-417.

Salmoni, A.W., Schmidt, R.A. and Walter, C.B. (1984) Knowledge of results and motor learning: a review and critical reappraisal. *Psychological Bulletin* **95,** 355-386.

Sanchez, X. and Bampouras, M.T. (2006) Augmented feedback over a short period of time: Does it improve netball goal-shooting performance? *International Journal of Sport Psychology* **37,** 349-358.

Scheeler, M.C. and Lee, D.L. (2002) Using technology to deliver immediate corrective feedback to preservice teachers. *Journal of Behavioural Education* **1,** 231-241.

Scheeler, M.C., Ruhl, K. and McAfee, J. (2004) Providing performance feedback to teachers: A review. *Teacher Education and Special Education* **27(4),** 396-407.

Schmidt, R.A. and Lee, T.D. (1998) *Motor Control and Learning: A Behavioural Emphasis*. 3rd edition. Champaign, IL: Human Kinetics.

Schmidt, R.A. and Wulf, G. (1997) Continuous concurrent feedback degrades skill learning: Implications for training and simulation. *Human Factors* **39,** 509-525.

Schmidt, R.A. and Wrisberg, C.A. (2004) *Motor learning and performance.* 3rd edition. Champaign, IL: Human Kinetics.

Silverman, S. (1994) Communication and motor skill learning: What we learn from research in the gymnasium. *Quest* **46,** 345-355.

Smith, R.E., Smoll, F.L. and Barnett, N.P. (1995) Reduction of children's sport performance anxiety through social support and stress-reduction training for coaches. *Journal of Applied Developmental Psychology* **16,** 125-142.

Stergiou, N., Harbourne, R.T. and Cavanaugh, J.T. (2006) Optimal Movement Variability: A New Theoretical Perspective for Neurologic Physical Therapy. *Journal of Neurologic Physical Therapy* **30(3),** 120-129.

Tzetzis, G., Kioumourtzoglou, E., Laios, A. and Stergiou, N. (1999) The effect of different feedback models on acquisition and retention of technique in basketball. *Journal of Human Movement Studies* **37,** 163-181.

Tzetzis, G., Kourtessis, T. and Votsis, E. (2002) The effect of instruction through modeling on people of different age and expertise in badminton. *Journal of Human Movement Studies* **43,** 251-268.

Tzetzis, G. and Votsis, E. (2006) Three feedback methods in acquisition and retention of badminton skills. *Perceptual and Motor Skills* **102,** 275-284.

Williams, A.M. and Hodges J.N. (2005) Practice, instruction and skill acquisition in soccer: Challenging tradition. *Journal of Sports Sciences* **23(6),** 637-650.

Wulf, G. and Shea, C.H. (2004) Understanding the role of augmented feedback: The good, the bad and the ugly. In: *Skill acquisition in sport: Research theory and practice.* Eds: Williams, A.M. and Hodges, N.J. London: Routledge. 121-144.

Wulf, G., Shea, C.H. and Matschiner, S. (1998) Frequent feedback enhances complex motor skill learning. *Journal of Motor Behavior* **30,** 180–192.

Vealey, R.S. (1986) Conceptualisation of sport-confidence and competitive orientation: Preliminary investigation and instrument development. *Journal of Sport Psychology* **8,** 221-246.

Vealey, R.S., Hayashi, S. W., Garner-Holman, M. and Giacobbi, P. (1998) Sources of sport-confidence: conceptualisation and instrument development. *Journal of Sport & Exercise Psychology* **20,** 54-80.

Vickers, J., Livingston, L., Umeris-Bohnert, S. and Holden, D. (1999) Decision training: the effects of complex instruction, variable practice and reduced delayed feedback on the acquisition and transfer of a motor skill. *Journal of Sports Science* **17,** 357-367.

Key points

- The type of the skill is a critical factor in determining the effectiveness of the feedback types.
- Different instructional methods of corrective feedback could have beneficial effects in the outcome and self-confidence of young athletes
- Instructions focusing on the correct cues or errors increase performance of easy skills.
- Positive feedback or correction cues increase self-confidence of easy skills but only the combination of error and correction cues increase self confidence and outcome scores of difficult skills.

AUTHORS BIOGRAPHY

George TZETZIS

Employment

Assistant Professor in the Department of Physical Education and Sport Sciences of the Aristotelian University of Thessaloniki.

Degree

PhD

Research interests

Motor learning and control, physical education teaching, research and physical activity.

E-mail: tzetzis@phed.auth.gr

Evandros VOTSIS

Employment

PhD student in the Department of Physical Education and Sport Sciences of the Aristotelian University of Thessaloniki.

Degree

MSc

Research interests

Motor learning, motor control and motor behavior, psychological development of youths.

E-mail: evandros@phed.auth.gr

Thomas KOURTESSIS

Employment

Assistant Professor in Physical Education and Sport Sciences of the Democritus University of Thrace.

Degree

PhD

Research interests

Motor coordination focusing on developmental coordination disorders.

E-mail: tkourtes@phyed.duth.gr

✉ **George Tzetzis**

Christopoulou 9, 54635, Thessaloniki, Greece.