

## The Effect of a Period of Feedback Training on Learning Shooting Skill among Inexperienced Shooters

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**Abstract:** The purpose of this research is to study the effect of a period of feedback training on learning shooting skill among inexperienced shooters. **Methodology:** The present research was semi-empirical and included three experimental groups and a control group. The population of this research consisted of 60 male students of Islamic Azad University, Aliabad Katool Branch, who were randomly chosen from physical education students of this university and were divided into four feedback groups: knowledge of results (KR), knowledge of performance (KP), combined (KR and KP) and a control group. First, a trainer familiarized subjects with the rifle and shooting. Then, they all took the pretest which involved shooting 10 shots toward the target. The training period consisted of eight weeks and three sessions per week. Each subject performed 20 shots and the score of each shot was recorded. At the end of the training period, subjects took the posttest. They also took the retention tests at the intervals of 48 hours, 10 days and one month afterwards. **Results/Findings:** The results of ANOVA test and Tukey's post-hoc test showed that performing feedback exercises had a significant effect on performance and learning and there was a significant difference between the experimental groups and the control group. Moreover, combined feedback training which included both KR and KP exercises had a greater and more significant effect on learning and performance in comparison with each of these exercises alone. These results also held for the retention tests ( $p < 0.05$ ). **Discussion and Conclusion:** The results of the present research suggest the positive effect of feedback exercises on performance and learning as well as the better and more significant effect of combined feedback training on performance and learning.

**Key words:** feedback training, knowledge of results, knowledge of performance, performance, learning, shooting

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### INTRODUCTION

The ability to learn is vital for living organisms. Learning enables living organisms to adjust themselves to certain aspects of their environment. Human beings have a greater ability to learn in comparison with other living organisms and this ability is more crucial for them. Assuming that human beings only had to live with the congenital capabilities they were born with, what difficulties they would face. Learning motor skills plays an important role in daily functions. Motor learning experience can range from relearning to walk after a stroke to acquiring a complicated sports skill.

It appears that learning motor skills is almost a constant process. However, it often refers to exercise conditions which involve conscious attempts for improving performance or special skills. Most learning activities are performed by practice; whether general courses such as physical education course in high school or private sessions such as private ski tutoring or physiotherapy treatments. Usually, and not always, there is a teacher, a therapist or a trainer who guides the exercise and activity of the individual, assesses learner's progress and makes decisions about future the activity for achieving maximum success in performance. Emphasizing on the role of the trainer and training conditions is considered as an important factor in educational activities and implies the necessity for carrying out research on various factors such as the nature of education, evaluation, exercise planning, etc.

The word learning is used in everyday conversations and has numerous definitions; thus, providing a proper definition for learning is rather difficult. That is why we encounter various definitions of learning in books on psychology. The most exhaustive and comprehensive definition of learning that encompasses a broad range of activities from memorizing a poem to progressing in a sport skill is: "a process in which behavior develops or changes as a result of practice and experience."

It is widely recognized that task performance improves with practice (Fitz, 1964; Adams, 1987; Schmidt & Lee, 1999; Magill, 2001). Thus, not only the amount of exercise, but also its condition and quality can have an important effect on learning and final performance (Schmidt & Lee, 1999). One of the essential determinants

of the process of learning motor skills is information in response to performance which is referred to as "feedback". The word feedback refers to closed-loop theory, meaning information regarding the difference between performance and the target condition. Recently feedback has taken a more general sense meaning any kind of sensory information about motion and not just error detection. Feedback is divided into two main categories: intrinsic feedback and extrinsic feedback.

Intrinsic feedback – sometimes referred to as inherent feedback – is information received as an inherent consequence of action; in other words, intrinsic feedback is inherently in the skill. Extrinsic feedback – sometimes referred to as augmented or sensory feedback – is information which is not inherent in a skill and is obtained via a trainer or an external stimulus such as movies, photos or spectators. Extrinsic feedback is itself divided into two categories: knowledge of performance (KP) and knowledge of results (KR).

A learner can achieve a certain skill level by intrinsic feedback but in order to achieve a higher level of proficiency, they need augmented feedback (Magill, 1994). In tasks where information is not provided from intrinsic sources, augmented feedback is required to determine whether movements are appropriate; or when the learner cannot obtain the critical information needed for learning a skill, augmented feedback can play an important role in acquiring the skill (Magill, 1994).

For several decades, researchers studying motor learning have been interested in augmented feedback which provides learners with information about the result of a movement in relation to the environmental goal after completing the response. In recent research studies, frequent presentation of knowledge of results has been regarded as an important factor in learning and its effectiveness was mainly studied using simple, one-degree of freedom tasks. In recent years it has been believed that the effects of augmented feedback not only depend on feedback frequency, but also on some other factors such as nature, mode, precision, amount and timing of the feedback (Magill, 1994; Wulf & Shea, 2002).

It has been shown that knowledge of results is related to everyday complicated tasks (Schmidt & Young 1991). Moreover, it has been suggested that knowledge of performance is more important than knowledge of results alone in tasks where proper outcome depends on the interaction between task segments (Newell & Walter, 1981; Newell & Carlton 1987; Schmidt & Young, 1991; Schmidt & Lee, 1999).

Rifle shooting is a proper motor task where augmented feedback may work well in facilitating skill acquisition. Naturally, the available sources of information in shooting skill are visual and proprioceptive. The primary determinant of success in a shooting task is the result, and the intrinsic feedback of the task cannot always provide necessary information for determining success in task performance. Information about the movement pattern in shooting is primarily based on coach's subjective observations of subject's shooting technique using a videotape of the performance (Schmidt & Young, 1991). Moreover, in rifle shooting, target is not always corresponding with movement pattern and the movement pattern can be distinct from the goal of performance (Schmidt & Young, 1991). Thus, there can be made a distinction between the feedback about movement pattern and the environmental goal. Further, the effects of augmented feedback can be assessed using the shooting result which is an unequivocal measure of performance outcome. Based on these considerations, it appears that shooting is an appropriate objective for studying the effects of augmented feedback.

The primary objective of the present research was to study whether augmented feedback regarding the characteristics and the result of performance has an effect on the environmental goal (shooting precision) among inexperienced shooters. In fact the purpose of this research was to add to the knowledge of the effects of augmented feedback, knowledge of result and knowledge of performance on performing complicated tasks in a period of learning.

### ***Research Methodology:***

#### ***Method:***

The research method was semi-empirical which was carried out as field research and by manipulating the independent variable of feedback, the researcher aimed to study its effects on the dependent variables of performance and learning.

#### ***Statistical Population and Sample of Research:***

The population of this research consisted of 60 male students of Islamic Azad University, Aliabad Katool Branch who were studying in the period of 2009-2010. Forty subjects were selected from this population and were divided into three experimental groups (knowledge from performance feedback, knowledge from result feedback and a combination of these feedbacks) and a control group.

#### ***Material:***

1. Air rifle: an A-48 air rifle was used in this research.
2. Special pellets used in rifle shooting events with a caliber of 4.5 mm made by Bijan Co., Iran
3. Special targets used in shooting events validated by Iran Shooting Federation

**Test Procedure:**

After selecting subjects and organizing research groups, an introduction session was held with the presence of all the subjects and administrators of the research where research procedure was explicated in detail and necessary explanations were made about the time and place of tests and at that very session personal characteristics questionnaires were distributed among subjects. Then, all subjects simultaneously participated in a session where the principles of shooting with air rifle were instructed in theory and practice by an experienced trainer. After the explanations of the trainer about the principles of shooting and when subjects became familiar with shooting equipment, each subject shot ten shots as practical acquaintance; then all subjects performed the shooting pretest involving ten shots to a standard target sheet and the results were recorded as a score from 0 to 100. The training period consisted of four weeks and three sessions per week. Thus, the training period included 12 sessions. In each session, according to the planned protocol, subjects of each group exercised shooting skill with 30 shots. During the training period, independent variables of the research including KR and KP feedbacks and a combination of these two were applied respectively to each group. The subjects who received KR feedback were allowed to observe the result of their performance after each trial and generally in each session, subjects in the first group were able to observe their performance 30 times. Subjects in the KP group received feedback about their performance from an experienced trainer. It must be noted that the trainer was responsible for the frequency of feedback and the time of providing a feedback was decided at his own discretion. The fourth group, that is the control group, received no feedback about their performance and they just shot thirty pellets during an exercise session without observing the result of their performance. At the end of the training period, the performance test was conducted exactly like the pretest involving a trial of ten shots toward a standard target sheet and the results were recorded as a score between 0 and 100. At three intervals – i.e. 48 hours, 10 days and one month of detraining – the retention test was conducted similar to the pretest and the performance test involving ten shots toward a standard target sheet and the results were recorded to assess the stability of retention.

**Statistical Tests:**

In the present research, descriptive statistics such as mean and standard deviation were used to describe the characteristics of research variables. Moreover, ANOVA for repetitive measurements were used to compare the means of the research groups. Furthermore, Tukey's post-hoc test was applied to determine the point of difference.

**Results:**

1. The results of the pretest: ANOVA test revealed that there is no significant difference between the pretest results of the groups ( $P < 0.05$ ; see Table 1).
2. Comparing groups' performance: the results of multivariate ANOVA showed that there is a significant difference between the performances of the three groups. Using Tukey's post-hoc test revealed that there is a significant difference between the experimental groups and the control group and that all the experimental groups had a better improvement in performance in comparison with the control group. Moreover, the performance of the combined group was at a higher level with respect to other groups and this difference was significant ( $P < 0.05$ ; see Table 1).
3. Comparing the results of the retention tests: the results of the retention tests were similar to the performance test indicating that the combined group demonstrated a better performance in the tests. Moreover, comparing the pretest with the retention tests revealed that learning has occurred in all the experimental groups and that there is a significant difference between the pretest and the retention tests in all the experimental groups ( $P < 0.05$ ; see Table 1).

**Table 1:** Mean scores of the groups.

	Control	KP	KR	KP & KR
Pretest	79.24	80.39	79.52	81.97
1 <sup>st</sup> Session	78.61	71.29	72.17	69.64
2 <sup>nd</sup> Session	76.97	71.46	70.94	68.92
3 <sup>rd</sup> Session	75.69	69.82	68.46	66.67
4 <sup>th</sup> Session	77.49	68.70	67.19	65.09
5 <sup>th</sup> Session	78.19	69.49	64.89	64.10
6 <sup>th</sup> Session	76.79	66.90	67.40	63.89
7 <sup>th</sup> Session	77.78	69.94	63.34	60.79
8 <sup>th</sup> Session	70.94	63.79	62.46	60.88
9 <sup>th</sup> Session	81.09	68.59	62.71	61.02
10 <sup>th</sup> Session	75.55	70.09	71.11	63.38
11 <sup>th</sup> Session	70.99	63.91	59.49	55.18
12 <sup>th</sup> Session	64.97	61.47	56.37	52.49
Retention (48 hours)	70.72	65.89	66.31	62.19
Retention (10 days)	72.48	67.48	66.36	62.08
Retention (30 days)	75.90	69.89	67.87	65.09

**Discussion and Conclusion:**

The purpose of the present research was to study the effect of a period of feedback training on the performance and learning of shooting skill among inexperienced shooters. The subjects were divided into the four feedback training groups of knowledge of result (KR), knowledge of performance (KP), a combined feedback group (KR & KP) and a control group. The results suggested the effect of feedback training on the performance and learning of subjects. The results were consistent with the studies of (Behrman *et al.*, 1992; Swanson & Lee, 1992, Lai & Shea, 1998, Blandin & Proteau, 2002), and (Guadagnoli *et al.* 2002) who found the positive effects of feedback presentation on the performance and learning of subjects in various sports skills.

From the practical perspective, the interesting finding of this research was that a period of feedback training facilitates and improves learning of subjects. Learning shooting skill is not a rather complicated skill and as the results of the present research reveal, there is not much difference between KP and KR groups and that difference is not significant. But this difference may be due to the nature of shooting skill and that KP feedback, due to displaying the precision scores of subjects, helps more to improve performance and to facilitate learning.

Moreover, considering the results of the present research, the combined feedback group demonstrated a better and more significant performance in comparison to other experimental groups indicating the greater effect of presenting both KP and KR feedbacks on shooting skill.

The results of this research support the idea that KR and KP feedbacks in shooting skill are effective for improving performance and facilitating learning (Mononen *et al.* 2003). Yet more studies are needed in this area to investigate various feedback training conditions and various frequencies during training which may help to improve performance and facilitate learning among subjects and to provide clearer results in this area.

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