International Journal of Modern Education Research
2015; 2(5): 57-61
Published online September 30, 2015 (http://www.aascit.org/journal/ijmer)
ISSN: 2375-3781

American Association for Science and Technology

Keywords
Alpine Skiing,
Mental Training,
Manual Response,
Coordination,
Focused Attention

Received: August 8, 2015
Revised: September 14, 2015
Accepted: September 16, 2015

Influence of Mental Training on Motor Coordination and Manual Response in Alpine Skiing

Emilia Florina Grosu[1], Vlad Teodor Grosu[2]

[1]Department of Individual Sport, Faculty of Phisical Education and Sport, "Babeș – Bolyai University", Cluj-Napoca, Romania
[2]Department of Mechatronics and Machine Dynamics, Faculty of Mechatronics, Technical University, Cluj-Napoca, Romania

Email address
emiliaflorina.grosu@gmail.com (E. F. Grosu), vtgrosu@gmail.com (V. T. Grosu)

Citation
Emilia Florina Grosu, Vlad Teodor Grosu. Influence of Mental Training on Motor Coordination and Manual Response in Alpine Skiing. *International Journal of Modern Education Research*. Vol. 2, No. 5, 2015, pp. 57-61.

Abstract
The aim of this study was to assess the influence of mental training on the increase in the attention and manual response in certain athletes (skiers). The samples of subjects tested are aged 12±5 and 16±1. Athletes are components of ski groups within School sports clubs. The experimental group comprises athletes from Gheorgheni, Baia-Sprie and the control group consists of athletes from Toplița, Sibiu, Predeal, Sinaia. Through this study, we analyzed the influence of mental training on the increase in focused attention and manual response in skiers. It is known that in alpine skiing knocking the poles is very important. We applied the ACRM (focused attention with manual response) test, which provides information on the ability of focusing attention in activities with imposed pace and dynamic field of observations, specific to alpine skiing. We conducted these tests after applying the mental training techniques in the experimental group and comparing the scores with those of the control group. The analysis was performed using SPSS 15.0. For the comparison of means between the groups of subjects, we applied ANOVA for the VP, EP and EX pretest measurements in order to assess whether the (control and experimental) groups are similar before the intervention. The intervention consists in the application of mental imagery techniques on certain components of alpine skiing technique based on hand-eye coordination. In addition, we calculated a t test for dependent samples for VP, EP and EX, both pretest and posttest, to assess whether the intervention produced any modifications. Findings indicate a statistically different modification following the intervention, in the scores for VP, EP and EX: $p=.000 < 0.05$ and $p=.001<0.05$. Among the indicators recorded through this test, it is worth noting the following: VP – perception speed = number of omissions, EP – perception accuracy = number of errors, EX – focused attention = correct answers /150+ wrong answers. Conclusion: considering the comparative analysis of scores to the tests applied to the groups of our study and the statistical significance, it can be posited that mental training through mental imagery improved outcomes in focused attention and manual response in the experimental group. These findings determine, in their turn, increased athletic performance in the groups studied, as it is obvious from the analysis of competitions that took place in January 2015.

1. Introduction

The literature on mental training uses terms such as "mental rehearsal", "mental practice", "visual-motor behavioural rehearsal", "mental practice (execution)", "disguised, hidden rehearsal", "hidden practice", "visualization", "cognitive rehearsal", "imaginary practice", "rehearsal in representation", "introspective rehearsal", "implicit practice", "ideomotor training", "mental imagination" (Schmidt, 1988; Murphy, 1992, Domey, 1988; Weinbwerg, 1988; Epuran, 1980, 1982; Holdevici-Vasilescu, 1988, cited from Grosu E. F., 1999) [4]. However, further comments and annotations are necessary for establishing clearer image of the concept of mental training.

Mental training consists in rehearsals in representation, not in concrete or practical rehearsals, and it is based on the capacity (acquired through instruction and practice) of becoming aware of one's own actions, of updating them by thinking of them, only through an adequate verbal expression. [3]

In this study, we test hand-eye coordination in alpine skiing, because it is an essential element for high sports performance. Coordination can be achieved by focusing attention.

Skiers must make their estimate *before* they start their transition. Misestimating the target in the upcoming turn, or not making the correct movements to take them there, might be the most common error that keeps good skiers from being great skiers. [10] Anticipation, also known as *windup – release*, is a technique used mostly in linked, short radius turns. Although inklings of the movement pattern can be seen in pictures of skiers from the 1950s and earlier, anticipation became commonly visible in the skiing of world-class ski racers in the mid-1960s. To this day, it remains a fundamental element of advanced short-turn technique. [10]

Skiers need to look into the next turn and decide just where they want their body to go, and then make it go there. In skiers, it is important to respect the following technical aspects, suggested by [11], with regards to practicing pole-planting - wrist movement. A strong pole – plant comes from a small flick of the wrist – the movement does not come from swinging the arms. Standing still, practice, moving the pole backwards and forwards with the wrist only. When it feels right, try the exercise while skiing. In the following lines, we will explain the importance of hand and arm position. One of the most common technical errors in skiing is dropping the inside hand, which pulls the skier's balance away from the outside ski. Another common problem, raising the outside hand, usually has some effect.

2. Problem statement

The capacity of combining/recombining complex mental images is determined by specific proprioceptive and kinaesthetic information processing [7]. We selected several drills that we applied to the experimental group within the physical training program. Hand on the hip and hand in the air [6]. This drill is excellent for sensing the moment for edge release and initiating the subsequent turn. To perform this drill, place your downhill hand on your downhill hand on your downhill hip and raise your uphill hand in front of your uphill shoulder. Repeat this movement several times. We also present other drills, such as carved turn with hands on knees; long leg, short leg; advance railroad track; traverse edge change; outside pole drag: to perform this drill, assume an engaged stance and extend your arms to the sides, holding your poles like swords. In the fall line, reach over the outside ski and etch an arc in the snow with your pole tip and your skis. [6]

In skiing, to improve your lateral stability at the control point, you must plant your pole at the end of the turn, not at the beginning of the next one. Get the pole ready early. Good skiers have their pole ready to plant when they are halfway through the turn. And when you plant it, plant it in the right place. Extend your arm well away from your body, and put the tip of the pole in the snow ahead of your hand. [8]

To help develop solid, quiet arms, this exercise is effective: tie a 5-foot (1.5m) piece of string into a loop. Put your hands in the loop, hold them far enough apart to keep the loop snug, and go skiing. The loop helps keep your hands where you want them and prevents you from dropping one or the other. A few runs like this every now and then will significantly improve your arm discipline and your lateral balance.

Watch the inside hands of World Cup skiers, particularly in the toughest turns. The inside hand is at least as high as the outside hand, and reaching in the same direction. The best skiers in the world strive for quiet, level arms. Those whose arm discipline is less than perfect usually admit that they would ski better if their arms did not move around so much. Limiting arm movement is of the basic training of all great skiers, who at some point in their lives have done countless drills to develop quiet, balanced hands. Try to keep your inside hand in your field of view at all times. Better still, work to keep both, hands at the same level, with forearms parallel to snow. Avoid the common problem of reaching forward with your downhill hand to plant your pole when your inside hand drops.

Doing so pulls your downhill shoulder and hip forward, flattening your outside ski. If your hands are always up, level and in front of you, you will hardly have to move your downhill hand to plant your pole in the right place at the right time. [8]

3. Methodology

3.1. Purpose of Study

The elaboration of training methods that include, in the teaching process, elements of psychology, mental imagery and feed-back regarding the conscious control of neuro-physiological correlates involved in the conception of representations or of proprioceptive and complex and complex movements. *The purpose* is to improve skills, coordination, trust, calm, and focus. It is more than daydreaming: the active study of an image or of a series of images and the use of all body senses – the athlete must fell as if he/she were on the move.

In order to determine the hand-eye coordination capacity in alpine skiing, we tested it by using a device called

Computer-assisted system for assessment in transport and labour psychology, 04/2007 version, created by Management Design SRL Iasi, by Professor Hăvîrneanu C. (2007), at Psitest Cabinet. According to the scheme of integrated functional blocks, the methodological core proposed provides the possibility of obtaining indicators of information, execution and self-regulation capacity – indicators of safe behaviour (according to the term "vigilance" as understood by Bonnardel. [7]

3.2. Methods

After applying the mental training techniques on the experimental group, significant alterations were found in certain parameters of hand-eye coordination. We considered that during competitions a skier is like a driver in a vehicle, in terms of attention (concentration and distribution) and hand-eye coordination. This test assesses aspects concerning the perception (speed and accuracy) and the operational efficiency of thought. Information on reactivity are completed by examining the simple reaction time (basic reactivity), [7].

The adjustment program consists in showing 50 rows of letters, among which only ½ comprise a stimulus letters. The feedback information for the examiner appears on the screen as a table that features live information on the subject's effectiveness [8].

The basic test is the showing of 300 rows of letters in two speed levels, each comprising 150 rows. Just like in the adjustment threshold, only ½ of them comprise "stimulus letters". Results are featured in a table comprising rough and standard grades (five normalized classes: I–IV), for each indicator.

From a technical perspective, we asked the athletes within the mental training program to consider the following essential aspects:

1. Ski straight down a cat track. Do not think about your feet but feel how your arms and hands are hanging. Note how claustrophobic it feels (or should feel) to hold your arms pressed against your sides. Then note how awkward it feels to hold your arms wide, as if you were hugging a redwood. Try to establish a comfortable position between these two extremes. Feel the way your arm rotates at the shoulder and bends slightly at the elbow and feel the slight flick of the wrist that comes at the end of pole swing.

2. Try swinging your arms smoothly and quickly, then swing them slowly. Approximate your timing for short turns and long turns. Feel the way your arms and hands move the same distance but at a faster or slower rate [4].

3. Positive pole-planting before impact, use your left wrist to swing the pole diagonally forwards into an angled position; using the O-frame posture you have been practising, angle the pole for maximum strength on impact; begin moving your right wrist, ready for the next plant, and maintain your O-frame arm position; try to angle the pole so that the basket is ahead of your hand (this will increase the power of impact); on impact, keep driving the wrist forwards and downwards to help maintain the shape of the O-frame posture; work the left-hand wrist to manoeuvre the pole into the correct angle for the next plant [11].

4. Results and Discussions

We calculated the ANOVA for pretest VP, EP and EX measurements, in order to determine whether the groups (control and experimental) are similar before applying the intervention. According to our findings, we posit that the groups are similar because we obtained a p = .587, P = .560, P = .361 > 0.05. Therefore, we cannot reject the null hypothesis according to which the groups are not different, see table no.1.

Table no. 1. *Results at the Anova Test.*

		Sum of squares	df	Mean square	F	Sig.
VP_pretest	Between Groups	24.083	1	24.083	.299	.587
	Within Groups	3704.583	46	80.534		
	Total	3728.667	47			
EP_pretest	Between Groups	77.521	1	77.521	.345	.560
	Within Groups	10327.292	46	224.506		
	Total	10404.813	47			
EX_pretest	Between Groups	.009	1	.009	.851	.361
	Within Groups	.491	46	.011		
	Total	.500	47			

We calculated a t test for dependent samples for VP, EP and EX, both pretest and posttest, to assess whether the intervention produced any modifications, see table no. 2

Table no. 2. *Descriptive statistics.*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VP_pretest	15.3333	48	8.90693	1.28560
	VP_posttest	7.0208	48	5.84731	.84399
Pair 2	EP_pretest	19.9375	48	14.87881	2.14757
	EP_posttest	14.1875	48	8.35300	1.20565
Pair 3	EX_pretest	.8221	48	.10312	.01488
	EX_posttest	.8948	48	.07497	.01082

Table no. 3. *Correlations and statistically significant.*

		N	Correlation	Sig.
Pair 1	VP_pretest & VP_posttest	48	.645	.000
Pair 2	EP_pretest & EP_posttest	48	.624	.000
Pair 3	EX_pretest & EX_posttest	48	.725	.000

We found statistically significant correlations – p =.000 < 0.05 – between pretest and posttest measurements for VP, EP and EX, see table no.3.

Table no. 4. *Test t"for dependent samples, pre/post VP, EP and EX.*

		Mean	Std. Deviation	Std. Error Mean	"t"	df	Sig. (2-tailed)
Pair 1	VP_pretest VP_posttest	8.31250	6.81099	.98308	8.456	47	.000
Pair 2	EP_pretest EP_posttest	5.75000	11.66646	1.68391	3.415	47	.001
Pair 3	EX_pretest EX_posttest	-.07271	.07106	.01026	-7.089	47	.000

Findings indicate the emergence of a statistically significant modification following the intervention, see table no 4, for VP, EP and EX, p =.000 <0.05 and p =.001<0.05.

5. Conclusions

Findings indicate the emergence of a modification in both the control and the experimental group, as follows. For VP before the intervention, M = 15.333, SD = 8.90, while afterwards M = 7.020 and SD = 5.84. For EP before the intervention, M = 19.93 and SD = 14.87, while afterwards M = 14.18 and SD = 8.35. Finally, for EX before the intervention M = .82, SD = .103 and after it M = .89, SD = .074.

The results are statistically significant following the intervention for scores in VP, EX and EP t (47) =8.456, t (47) = 7.089 p=.000 < 0.05 and t (47) =3.415 p =.001< 0.05.

Skiers trying to increase their pole-plant strength often make the mistake of swinging their arms up and down in an attempt to increase the power of the plant. To develop the strength of your pole – plant correctly, work on the following techniques [10]. They are designed to stabilize your arms and improve the power of your pole-plant. Considering both the comparative analysis of scores to the tests applied to our study groups and the statistical significance, we may conclude that mental training by using mental imagery improved outcomes in attention and manual response in the experimental group. This actually means that mental training increased athletic performance in the groups studied, which confirms our hypothesis. Such training can contribute to: a) focus on the aggravating skiers segments, b) focusing on consistency in achieving psychomotor activity, as opposed to reality, in which the skier makes progressing dropouts, c) focusing on the complete execution of activities, d) practicing proper rhythm of breathing and e) establishing the existence of calmness in overcoming ski tasks (the destination from start to finish). [9]

Alpine skiers, including Lindsey Vonn of the United States, will use their hands to simulate the path of their skis. Other skiers thrust both hands forward, often while gripping poles shortly before the start, and see themselves skiing the course through their own eyes. [1] It is worth adding that the purpose of mental representation is to use mental imagery in order to reproduce mentally the sensations and feelings experienced while performing a skill.

Acknowledgements

We are very grateful to the skiers and ski trainers who participated in our experiment, especially athletes within the following Clubs: CS Baia – Sprie (MM), SGH – CS Gheorgheni (HR). We would also like to thank the students of the Faculty of PE and Sports (specialized in ski) of the Babes – Bolyai University, who helped us during the experiment, as well as to the skiers of the other ski clubs in Romania: CS Sinaia (PH), CS Predeal (BV), CS Crazy – Bike Sibiu (SB), CS Piatra – Neamt (NT), CS Miercurea-Ciuc (HR).

References

[1] Clarey, C. (2014). Olympians Use Imagery as Mental Training, The New – York Times, Olympics, Feb. 22, 2014, http://www.nytimes.com/2014/02/23/sports/olympics/olympians-use-imagery-as-mental-training.html?_r=0.

[2] Elling, R. M. (2003). The All Mountain Skier, Second edition, Ragged Mountain Press/ McGraw Hill, USA, P.O. Box 220, Camden, ME 04843.

[3] Epuran, M. (1982). Metodologia cercetării activităţilor corporale. Bucharest, Institutul de Educaţie Fizică şi Sport, vol. 1, pp. 51.

[4] Grosu, E. F. (1999). Aplicaţii ale antrenamentului mental în sport. Acţiune motorie versus acţiune psihică, Cluj – Napoca, GMI Publishing House, vol. 3, pp. 2.

[5] Grosu, E.F. (2012). Tehnici de antrenament mental, Editura GMI, (3rd ed), ISBN 978-973-1776-40-8, ISBN 978-973-1776-41-5, Cluj - Napoca, România, pp. 9.

[6] Fellows, C. (2011). Total Skiing. The proven pyramid approach for improving: functional movement, fitness, technique, tactics. United State, Human Kinetics.

[7] Hăvârneanu, C. (2007). Psitest cabinet, Sistem informatizat pentru evaluarea în psihologia transporturilor si a muncii, Versiunea 04/2007, Iasi, Management Design SRL , pp. 1.

[8] Hăvârneanu, C. (2011). Evaluarea psihologică a conducătorilor auto. Iaşi, University "Alexandru Ioan Cuza" Publishing House.

[9] Joksimovic, D., et all (2012) Forms and Types of Mental Training of Alpine Skiers, *APES* 2 (2012) 1: 109-111, http://fsprm.mk/wp-content/uploads/2013/08/Pages-from-SpisanieAPESbr.1-2012, 22. pdf

[10] LeMaster, R. (2010). Ultimate skiing, Master the techniques of great skiing, United States: Human kinetics, Champaign, pp. 150.

[11] Warren, S. (2006). Go Ski, with live-action. DVD coaching, DK, first publish in Great Britain by Dorling Kindersley Limited, London, New York, Munich, Melbourne, Delhi., www.dk.com, pp 98-99.