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Structure of Cognitive Abilities and Skills of Lifeguards

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A B S T R A C T

The presence of lifeguard service on beaches greatly contributes to reducing the number of accidents in and around the water. The lifeguard can be a person with good motor, but also cognitive skills and abilities. In addition to good swimming skills, lifeguard must be able to quickly detect and recognize the accident, and also to be able to timely and correctly act in case of accident in water, but also at the beach. The goal of this study is to determine the structure of cognitive abilities and skills with the sample of lifeguards that work on Montenegrin beaches. Battery KOG-3 was applied on the sample of 40 lifeguards. The collected and achieved results lead to following conclusion: the subjects have good ability to determine relation between elements of a structure and lower characteristics of that structure; subjects have good ability to assess the efficiency of serial processor; and subjects have good ability to assess efficiency of perceptive processor.

Key words: *cognitive abilities, tests, lifeguards*

Introduction

There is acute problem how to reduce the number of accidents in around the water in all countries (Ljubojević & Terzić, 2013). In addition to swimming training (Milošević, 2003), lifeguard training and organization of lifeguard service is efficient model that countries use in order to increase the level of safety on beaches and other swimming places. In Montenegro, the number of drowning significantly decreased since the lifeguard service has been present at all beaches (Ljubojević & Terzić, 2013). Given the fact that Montenegrin coast is recognized as attractive tourist organization, the need for more well-trained lifeguards increased. It is important to emphasize that the length of Adriatic coast that belongs to Montenegro is 300 km, but all beaches are, by its configuration, very different, from very long, wide, and sand beaches, to small, narrow, rocky, inaccessible beaches. This should be kept in mind when we discuss the profile of a lifeguard, his/her morphological and connotative characteristics, and motor and cognitive skills and capabilities.

According to some previous research (Guilford & Zimmerman, 1956; Cattell, 1963, 1971; Momirović, 1975; Momirović, Šipka, Wolf, & Džamonja, 1978; Momirović, Gredelj, & Hošek, 1980; Wolf, Momirović & Džamonja, 1992) that treated the problem of structure of cognitive skills, the problem subject and goal of study is defined. The goal of this study is to determine the structure of cognitive abilities and skills with the sample of lifeguards.

Methods

Battery KOG-3 was applied on the sample of 40 lifeguards who professionally work as beach lifeguards in various locations. It was taken into account that lifeguards encompassed with this study work on beaches along the Montenegrin coast, from the border with Albania to the border with Croatia, due to abovementioned differences in beach conditions they cover. Testing was conducted with lifeguards who already work on Montenegrin beaches, and it was performed in framework of their annual medical control, and regular check of lifeguard skills and knowledge.

"KOG-3" Battery (Wolf, Momirović & Džamonja, 1992) is used for achieving the basic goal, i.e. to determine level of general cognitive capability. Battery KOG-3 consists of three tests, as follows: pictures comparison test – IT1,synonyms and antonyms test– AL4, and visual specialization test S1. IT -1 test is pictures comparison test. It is designed as the test of general perceptive factor, which is, actually, synthesis of primary factors of perceptive identification, perceptive analysis, and perceptive functioning. Test contains 39 multiple choice tasks in which the subject needs to identify which, out of 4 suggested pictures, is identical to the given picture. Time is limited to four minutes. Synonyms and antonyms test (AL4) is designed as test of verbal comprehension. It consists of 40 pairs of words, and task for subject is to identify whether the words in pair have the same or opposite meaning. Time is limited to two minutes. Visual specialization test (S1) is designed as classic multiple choices test. It consists of 30 tasks in which the subject needs to find, in 4 transverse projections of one set of bricks, a projection that is adequate for that group. Collected data are analyzed via basic descriptive statistical methods, and after that the Pearsons's correlation analysis was used. Furthermore, data are processed through factor analysis. Factor analysis represents correlation technique as it seeks group of variables that are related or similar in terms of "joint moving", and therefore they are highly correlated.

Results

Table 1 shows basic descriptive parameters of cognitive capability variables.

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Table 1. Basic descriptive parameters of cognitive capability variables

Variable	$\bar{X}$	SD	Min	Max	V%	Sx	Vš
IT1	35.28	5.67	28.00	39.00	17.05	0.40	11.00
AL4	38.13	3.37	32.00	40.00	9.07	0.24	8.00
S1	25.80	5.70	19.00	29.00	23.94	0.40	10.00

If you analyze the Table 1, it is evident that results achieved through this research are similar to the results of some previous researches (Milošević, 1987; Popović, 1990; Momirović et al., 1975, 1978, 1980).

Table 2. shows inter-correlation matrix.

Table 2. Inter-correlation matrix of cognitive capability variables

Variable	IT1	AL4	S1
IT1	1.00		
AL4	0.52	1.00	
S1	0.35	0.48	1.00

Intercorrelation matrix shows relatively high correlation coefficients. The highest correlation coefficient is achieved between variables AL-4 and IT-1, i.e. test for assessing efficiency of serial processor with the test for assessing efficiency of input processors highly significantly correlate.

Table 3 shows matrix of factors of cognitive capabilities.

Table 3. Matrix of factors of cognitive capabilities

Variable	FAC_1	h^2
IT1	0.78	0.61
AL4	0.85	0.72
S1	0.75	0.57
LAMBDA	1.91	
%	63.80	
KUM%	63.80	

Discussion

By applying the principal components method with Guttman-Kaiser (GK) criteria, there is only one characteristic root and its corresponding vector are found as significant (Table 3).Variable system is reduced on one principle component. Communalities of variable are significantly high are their range is 0.75-0.72.

The lowest is recorded with test S-1, which assessed the efficiency of parallel processor, i.e. ability to identify relations and correlations. This test belongs to the processor for parallel, simultaneous processing of information, which is capable to simultaneously process a number of information flows, and to search the memory simultaneously, both short-term and long-term.

Test AL-4belongs to processor for successive, serial processing of information, which performs sequential cognitive processes and analysis of information transformed into the symbolic code. Test IT-1 belongs to processor for decoding, structuring, and search of input information that, in interaction with other processors of cognitive system, creates basis for perceptive ability.

The main component with 63.8% of variance behaves as general cognitive factor. All tests have high level of correlation with this factor, which is also main subject of measurement of all elements of cognitive abilities in this sample of subjects. Results achieved in this way can be interpreted, with high level of reliability, in framework of Cattella cognitive theory (1963, 1971).Dimension interpreted as efficiency of perceptive processor is very close to general perceptive factor (Gp); dimension interpreted as efficiency of parallel processor is very close to factor of fluid intelligence (Gf); while dimension interpreted as efficiency ofserial processor can be accepted as measure of factor of crystalized intelligence (Gc), (Cattell, 1963, 1971; Horn & Cattell, 1966).

Based on the results achieved, following can be concluded: Subjects have good ability to determine relation between elements of some structure and lower characteristics of such structures (Test S-1); Subjects have good ability to assess efficiency of serial processor (Test Al-4); and Subjects have good ability to assess efficiency of perceptive processor.

Results of this study and research can be helpful in profiling staff for such responsible job as the beach lifeguard is.

R E F E R E N C E S

Catttell, R.B. (1963). Theory of fluid and crystallized intelligence: a critical experiment. *Journal of Educational Phychology*, *54*, 1-2.

Cattell, R.B. (1971). *Abilities; their structure, grown and action*. Huhton Miggilin, Boston.

Cattell, R.B. (1973). *Parsonality and mood by questionnaire*. Bass, San Francisco.

Guilford, J.P., & Zimmerman, W.S. (1956). Furteen dimensional temeperament factors. *Psychological Monographs, 70*, 1-26.

Horn, J.L., & Cattell, R.B. (1966). Refinement and test of the theory of fluid and crystallized general intelligence. *Journal of Educational Psychology*, *57*(5), 253-270.

Ljubojević, M., & Terzić, I. (2013). Spasilaštvo na vodi–znanje, hrabrost, humanost. *Sport Mont, 37,38,39/*XI, 182-185.

Milošević, D. (1987). *Specifičnosti antropoloških karakterisitka učenika i učenica u odnosu na domicil*. Magistarska teza. Fakultet fizičkog vaspitanja, Beograd.

Milošević, D. (2003). *Strah–emocija koja otežava učenje plivanja*. Saopštenje na Ljetnjoj školi pedagoga fizičke kulture, Čanj.

Momirović, K. (1975). *Metode za transformaciju i kondenzaciju kinezioloških informacija.* Zagreb, Fakultet fizičke kulture.

Momirović, K., Šipka, P., Wolf, B., & Džamonja, Z. (1978). Prilog formiranju jednog kibernetičkog modela kognitivnih sposobnosti, *VI Kongres psihologa Jugoslavije*, Sarajevo.

Momirović, K., Gredelj, M., & Hošek, A. (1980). Funkcija perceptivnog, paralelnog i serijalnog procesora u sistemu za strukturiranje kretanje. *Kineziologija, 10*(3), 5-9.

Wolf, B, Momirović, K., & Džamonja, Z. (1992). *Baterija testova inteligencije.* Centar za primenjenu psihologiju Društva psihologa Srbije, Beograd.

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