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STUDY REGARDING THE DYNAMICS OF AFFECTIVE MANIFESTATIONS IN MIDDLE DISTANCE AND LONG DISTANCE RUNNERS, IN DIFFERENT SITUATIONS OF MENTAL STRESS

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Abstract

Introduction. High performance in track and field is constantly conditioned by the athletes' reaction to different stress factors. The analysis of mental stress on athletes in different situations has made certain specialists to say that the psychological effect of a stress agent (seen as a response of the athlete) is less predictable than the physiological effect, one reason being the complex and difficult nature of objectively predicting the response provoked by the effect of the stress factor, considering the fact that high performance athletes react differently to the pressure of complex situations during training and competitions.

Methodology. The research was conducted on 12 subjects with different experience in high performance track and field/athletics, and in this specific event. The subjects were given three psychological tests, within a period of six months, during three different stress situations: two tests (initial and final) before two major competitions (the national championships - selection competitions), and an intermediate testing (halfway between the two competitions, when the subjects were in full training process for the second competition). During these six months the previously planned training program was followed, but with a larger emphasis (in comparison with other training periods) on the psychological training of the athletes.

Results. The statistical analysis of the values for the studied variables has shown the existence of significant differences only in the manifestations associated with certain psychological states of the ones we studied, during different tests.

Conclusions The affective manifestations of the middle distance-long distance runners during different situations of mental stress present an oscillatory dynamics with a slightly descendant curve, showing a complexity of the psycho-affective states and reactions.

Key words: mental stress, emotional manifestations, track and field, middle-long distance running.

Introduction

The body's reactions generated by stress factors, but also the stress regarded as a reaction of the body, are permanently accompanied by modifications in the complex states, characterized by a high level of affectivity, which can involve an excess of emotional responses (psychological component). In the professional, high performance athletic activity, due to its intensity and specific nature, the affective responses are expressed more than visibly in the athletes' behavior, in their language, in their general and specific psycho-motor activity.

Various studies and researches tried to suggest, throughout time, a large series of strategies for determining and controlling the different affective states (D.M.McNair, et al. 1971, S.L.Gordon, 1981, R.S. Lazarus, S.Folkman, 1984, G.Mandler, 1984, H.R.Beech, 1989, R.E.Thayer, 1989, 1996, P.R.E.Crocker, 1992, J.Cosnier, 1994, M.Miclea, 1997, V.Grigore, G.Mitrache, 2008), especially for the athletic high performance activities, where the manifestation of the psycho-affective reactions surpasses the "normal" (J.E.Kane, 1966, B.J.Cratty, Y.L.Hanin, 1980, R.Martens, 1987, 2004, R.Martens, S.Vealey, D.Burton, 1990, L.Hardy, J.Graham, D.Gould, 1996, E. Thill, P.Fleurance, 1998, Y.L.Hanin, 1999, M.J.Stevens, M.A.Lane, 2001, R.S.Weinberg, D.Gould, 2007, G.Tenenbaum, 2007, F.Warburton, M.Pia, 2010).

The dynamics of the affective manifestations, especially in professional high performance athletes, is influenced by different factors (biological, psychological, social, environmental, etc.). The body's resistance to the stress-inducing action, as well as the adaptation reaction that is immediately produced, depend on the balance between

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the acting factors. However, according to some authors (M.Cosma, 2000), we cannot ignore the fact that in optimal conditions of emotional balance, the reactions cannot be inadequate to the stimuli, maladapted in the situations in which the emotional endurance capacity is overcome by the intensity of the demands, by the violence of emotional traumas, of by the prolonging and influence over time.

Previous research in the field of professional sports highlighted the fact that stress is directly influenced by the level of the psycho-affective states before a competition period. This level is increased more if the importance of the competition is higher, manifesting itself through the development of negative emotions, feelings of apprehension and tension, associated with a high activation level of the body.

In different stress conditions, in the case of professional athletes, the perception of the result's incertitude, as an inherent factor, is tied to the subjective probability of success, meaning to the chances that the subject grants himself for achieving the desired result (D.Delignieres, 1993, 2008), a fact that can determine an increase in the psychological tension, with more or less obvious repercussions on the individual's emotional state.

For this research, we focused on highlighting the aspects regarding the dynamics of certain affective manifestations in specific, but different, competition stress conditions, in middle distance and long distance runners.

We specify that the research was conducted through a specific psychological training program, over the course of 6 months.

Research Methodology

Research hypothesis

Certain affective manifestations determined by the various mental stress situations in the middle distance and long distance runners can present a slightly oscillating dynamics, but with a decreasing tendency when the mental stress-generating situations are modeled within a specific psychological training program.

The *subjects* of this research were 12 professional middle distance and long distance runners (8 male and 4 female) (Table 1), from 5 Romanian sports clubs, with an average age, at the beginning of the experiment, of 22 (minimum 18, maximum 28), with an experience in track and field between 5 and 14 years, and a specialization in the middle distance and long distance events of minimum 4 years. The subjects' athletic performances are from good (nationally medaled) to very good (multiple national and Balkan champions, medaled in various editions of the European Cup, participants, and some of them , even finalists in World and European championships for juniors and youth).

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The research instrument we used was an adapted form of the P.O.M.S. test (the Profile of Mood States, as described by McNair, 1971). This test was applied as a questionnaire. Based on indications, the obtained scores were transfered on a specific test profile chart, comprising T-scores for each factor. The graphical representation of the data shows "iceberg"-type diagrams, with the visible side being delimited by a line found at the 50 point mark. The variables subjected to the POMS analysis usually are: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment.

For this paper, we focused on three of the six psycho-affective states:

- *tension-anxiety (T-A)* - a variable highlighted by adjectives describing a high somatic tension ("tension," "on the edge"), as well as observable psycho-motor manifestations ("weak," "restless"). The adjectives referring to an anxiety and diffuse state are: anxious, embarrassed;
- *depression-dejection (D-D)* - represents a depressive mood, accompanied by a feeling of inadequacy, being described by scales that indicate feelings referring to a lack of personal value, uselessness when trying to adapt ("unworthy," "hopeless," "desperate"), a feeling of emotional isolation from others (sad, lonely, helpless, miserable), sadness (sad, unhappy), and guilt (guilty about something done);
- *fatigue-inertia (F-I)* - a variable that highlights a state of tiredness, inertia, and a low level of energy;

In order to determine the dynamics of the affective manifestations in various mental stress conditions, we applied the tests in 3 moments of maximum importance for the high performance activity of the subjects. As the level of psychological manifestations is higher during athletic competitions, the tests envisaged 3 major competitions, in different moments in time during the competition season, with different meaning for each subject. The tests we conducted as follows:

- the initial testing (February 2011, National Senior Championship, indoor, main objective - medal);
- the intermediary testing (June 2011, International Championship, outdoor, mai objective - time);
- the final testing (August 2011, National Senior Championship, outdoor, main objective - medal);

The determination of the psycho-affective moods appearing before the athletic competitions was done in the first day for each of the three competitions, in the morning, after the athletes woke up and served breakfast, the testing being supervised by a psychologist.

The utilized means system

We applied 30 means destined for a specific psychological training, in 48 lessons, throughout 24 weeks (6 months). The specificity of the lessons was adapted, mainly to regulate the dispositions generated by the 6 variables evaluated through the POMS test.

We must mention that the athletes' training before the three envisaged competitions (the final 6 days before entering the competition) did not include any more high levels of intensity or volume, the runners performing standard training sessions, specific to the week before the competition. These training sessions have subjected no longer the body to new adaptations or stimuli, having as main goals: the active rest, maintaining the obtained energy to an optimal level, the psychological and tactical preparation for the competition.

In order to have a point of reference as objective as possible for comparing the subjects' behavior during the three moments of testing, we transformed the obtained performances into points, in compliance to the IAAF regulations, and we did an analysis of the correlations between the affective manifestations and the recorded performances.

The statistical-mathematical analysis imposed the use, among others, of the following operations: calculation of the arithmetical mean, calculation of the standard deviation, determination of the variability coefficient, of percentages, of the significance threshold, of the confidence interval (Student's **t**-test), and of the Pearson's **r** correlations.

Results

The existence of differences that were statistically significant between the three moments of testing, has allowed us to observe the following:

- the obvious and continuous decrease of the variable T-A values (Tables 2 and 3), form one test to the other, highlights the positive influence the psychological training program for the regulation of competition stress had on the subjects. Thus, at the end of our research, we can say that the middle distance and long distance runners can manifest diminished states of somatic tension and anxiety (Figure 1), being able, through psychological training, to control certain reactions determined by various stress-inducing situations (such as a competition);
- if during the intermediary testing (T2) we could observe a significant increase in the mental fatigue and a decrease in the energy level (variable F-I, from 47.33 to 53.00 points, due also to the fact that the subjects were at T2 time at the end of their training period, when the workload reached its maximum peak), during the final testing, the values return under the 50 points threshold, which is considered a point of reference by the POMS test (average values of 48.42 points). After comparing the initial and the final values, we can see that the subjects have developed the ability to control and regulate their level of mental fatigue, generated by the effects of competition stress;
- regarding the variable D-D, we can observe an oscillatory evolution (Table 3), with a slight increase from the initial testing (T1) to the intermediary testing (T2), so that afterwards to be found a decrease of average values from the intermediary to the final testing (T3). However, as the average values are under the reference point (50) imposed by the POMS test, we can say that the depressive moods, accompanied by a feeling of inadequacy, of feelings referring to a lack of personal value, uselessness when trying to adapt ("unworthy," "hopeless," "desperate"), a feeling of emotional isolation from others (sad, lonely, helpless, miserable), sadness (sad, unhappy), and guilt (guilty about something done), do not significantly modify their intensity in the middle distance and long distance runners. In other words, the affective manifestations determined by various athletic competition events, mental stress-generating, do not record significant values for the practice of professional middle distance and long distance running.

The comparison of the psycho-affective moods profile (POMS) for the three tests and the data recorded in the final testing, after applying the special psychological training program, allowed us to observe the following:

- visible decreases (Table 4) in most of the analyzed variables, and especially from T2 to T3, and from T1 to T3;
- the largest decrease in the affective manifestations can be found in the tension-anxiety variable (T-A), where we can clearly see a tendency of constant decrease of the average value with more than 2.5 points of the profile chart (Table 4). After analyzing the dynamics of the average values calculated statistically-mathematically, we can say that the application of a specific psychological training can determine a decreasing evolution (involution) of the affective dispositions that are characterized by a high somatic tension ("tension," "on the edge"), as well as observable psycho-motor manifestations (anxious, restless, embarrassed);
- the smallest decrease can be observed for the variable D-D (Table 4), but as the compared values (T1 and T3) are below the 50 points limit, we can say that the moods that are characteristic to depression and low level of self-esteem cannot be usually found in middle distance and long distance runners;
- we observed a small increase towards the end of our research for the variable F-I (1.09 points), but this has a real justification, taken from the practice of sports: as the final important competition was placed in August 2011, 6 months after the beginning of a new training stage, and as up to that date the athletes had been participating in many athletic competitions, the slight increase in the mental fatigue at the end of the competition season, is normal, in our opinion.

The comparative analysis in a chart of the subjects' profiles during the three tests (Figure 4) suggests a clear modification of the psycho-affective

dispositions, from one mental stress state to another. We observed:

- a decreasing dynamics regarding tension-anxiety (T-A), being very close to the reference point (50), under which the observable psycho-affective phenomena are considered to no longer represent manifestations generated by mental stress;
- a preservation, and afterwards a decreasing dynamics of depression-dejection (D-D), although in this case we cannot speak of significant affective manifestations in the subjects, given the average values under 50;
- a slightly increasing dynamics of mental fatigue, due, in our opinion, to accumulation of fatigue generated after a long season of training and competitions. The 1.09 increase of the average values from the initial testing (T1, competition stress factor during indoor season) to the final testing (T3, mental stress factor during outdoor season) is insignificant, the comparative statistical analysis done through the Student's t-test (with a significance threshold of $p < 0.05$) being conclusive.

The qualitative analysis of the statistical correlations regarding the sense of average values modifications for the psychological variables throughout the duration of this research, has emphasized the following aspects:

- *the variable T-A*, although initially did not correlate with the points scored in the track and field event (being close to zero), after the intervention program it correlated negatively (Table 5) with the points recorded during the third competition (August 2011). As the variable T-A evaluates psycho-affective states that are characterized by somatic tension, anxiety, being a negative dimension, according to the sports psychology descriptions, we can estimate that as the subjects tend to have lower T scores for this variable, they will tend to have better performances during their track and field competitions. Practically, a descending dynamics of the affective manifestations values can determine an ascending dynamics of athletic performances in professional middle distance and long distance runners;
- *the variable D-D* correlates negatively and relatively the same with the points obtained by transforming the athletic performances recorded by the subjects during the February 2011 competition (before our intervention), and during the August 2011 competition (after finishing the intervention program - Table 5). We could estimate that the intervention program did not have any effect on the link between D-D and the subjects' athletic performances. This is a normal aspect, as our program did not focus on regulating this variable, D-D not recording high enough values to attract our attention;
- *the variable F-I* correlated negatively and weak with the points obtained during the February 2011 competition (before the intervention), but throughout the psychological training period and at its end, the correlation tends toward zero (null, Table 4). This aspect allowed us to think that the psychological training program we applied had an effect of weakening the link between F-I and athletic results, the subjects (professional athletes) managing to control their fatigue-inertia levels during the competitions in which they were directly involved.

Discussions and Conclusions

Our hypothesis, stating that "certain affective manifestations determined by the various mental stress situations in the middle distance and long distance runners can present a slightly oscillating dynamics, but with a decreasing tendency when the mental stress-generating situations are modeled within a specific psychological training program" was confirmed, as the data presented in the paper proves it.

Maintaining within normal limits, throughout a specific competition period, through a specially adapted psychological training program, the psycho-affective manifestations, characterized by depressive states (variable D-D), at the same time decreasing significantly the negative influences of the psychological and somatic tension states, anxiety (T-A), and confusion in thought before the important competitions, can constitute an useful way when the goal is obtaining high athletic performances in the middle distance and long distance events.

The selection of original methods for developing the ability to control the psycho-affective dispositions that are specific to a crisis situation (as is the one provoked by mental stress), as well as their adapted application in training, can create an improvement of the professional athletes' abilities before an important competition, when trying to control or regulate the negative psychological tensions, and the psychological fatigue which is unavoidable before competitions.

Form the point of view of the affective manifestations determined by the athletes' reactions to stress, we can say that, although a good part of the affective manifestations caused by the mental stress during competitions are present also in other sports branches, the specificity of physical and psychological demands during the professional high performance track and field activity determines reactions to stress with intensities and values that are different from the ones recorded in athletes practicing other sports. This aspect determines, in our opinion, the middle distance and long distance runners to live their psycho-affective moods at a different intensity.

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Table 1 - The subjects - identification data

No.	Subject	Age	Experience in track and field	The event the athlete is specialized in	Experience in that event
Subjects - Men's					
1.	G.I.	23	9 years	3000m hrdl.	6 years
2.	S.A.	20	5 years	5000 m, 10.000m	4 years
3.	I.C.	26	11 years	5000 m, 10.000m	8 years
4.	C.V.	20	7 years	800m	5 years
5.	P.G.	21	8 years	800m, 1.500m	7 years
6.	G.A.	23	11 years	3000m hrdl.	8 years
7.	Z.I.	28	17 years	800m, 1.500m	12 years
8.	M.I.	19	8 years	800m, 1.500m	4 years
Subjects - Women's					
9.	F.C.	23	9 years	5000m, 10.000m	4 years
10.	B.C.	19	6 years	800m, 1.500m	4 years
11.	B.A.	24	14 years	1500m, 3000hrdl.	8 years
12.	C.I.	18	5 years	800m, 1.500m	4 years

Table 2 - Data recorded by the subjects

No.	Initials	gender	age	T-A			M	D-D			M	F-I			M
				t1	t2	t3		t1	t2	t3		t1	t2	t3	
				S	S	S		S	S	S		S	S	S	
1.	G.I.	M	23	47	54	48	49.67	42	41	49	44.00	40	41	40	40.33
2.	S.A.	M	20	63	58	62	61.00	48	47	49	48.00	54	45	48	49.00
3.	I.C.	M	26	51	49	51	50.33	41	44	40	41.67	45	52	48	48.33
4.	C. V.	M	20	55	54	52	53.67	39	39	48	42.00	41	54	49	48.00
5.	P.G.	M	21	65	61	60	62.00	50	60	58	56.00	55	51	57	54.33
6.	G. A.	M	23	63	60	45	56.00	46	48	39	44.33	49	57	45	50.33
7.	Z.I.	M	28	55	47	51	51.00	59	59	48	55.33	52	60	37	49.67
8.	M.I.	M	19	57	52	50	53.00	55	53	53	53.67	51	63	52	55.33
9.	F.C.	F	23	52	51	48	50.33	44	42	43	43.00	41	52	45	46.00
10.	B.C.	F	19	55	55	51	53.67	45	45	41	43.67	40	55	43	46.00
11.	B. A.	F	24	55	51	43	49.67	40	40	37	39.00	43	49	51	47.67
12.	C.I.	F	18	63	58	54	58.33	55	56	53	54.67	57	57	66	60.00
Average			22	56.75	54.17	51.25	54.06	47	47.83	46.5	47.11	47.3	53.0	48.4	49.58
	Max		28	65	61	62		59	60	58		57	63	66	
	Min		18	47	47	43		39	39	37		40	41	37	
	ampl		10	18	14	19		20	21	21		17	22	29	

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	S	3.05	5.63	4.41	5.48		6.54	7.44	6.50		6.37	6.15	7.73	
	Cv	13.84	9.91	8.14	10.69		13.91	15.56	13.98		13.46	11.60	15.9	

Table 3.
The T test of comparing the averages between the the three tests, in the case of the 3 studied psychological variables

POMS	Averages T1-T2	T Test T1 – T2	Averages T2-T3	T Test T2 – T3	Averages T1-T3	T Test T1 – T3
T-A	56.75 54.17	t (11) = 2.385, p = 0.036	54.17 51.25	t (11) = 2.338, p = 0.042	56.75 51.25	t (11) = 3.538, p = 0.005
D-D	47.00 47.83	t (11) = 0.890, p = 0.392	47.83 46.50	t (11) = 0.781, p = 0.451	47.00 46.50	t (11) = 0.288, p = 0.778
O-I	47.33 53.00	t (11) = 2.693, p = 0.021	53.00 48.42	t (11) = 1.749, p = 0.108	47.33 48.42	t (11) = 0.551, p = 0.593

Table 4 - Comparative analysis of the T scores in the three tests

Average of the T Scores			
Testing	**T-A**	**D-D**	**F-I**
Initial testing (T1)	56.75	47.00	47.33
Intermediary testing (T2)	54.17	47.83	53.00
Final testing (T3)	51.25	46.50	48.42
Difference T2 – T1	**- 2.58**	**+ 0,83**	**+ 5,67**
Difference T3 – T2	**- 2.92**	**- 1.33**	**- 4.58**
Difference T3 – T1	**-5.5**	**-0.50**	**+1.09**

Table 5 - The Pearson r correlation coefficients between the values of the psychological variables and the values from the students' points recorded during the analyzed track and field competitions

Variable	**Score 1 (N = 12)**	**Score 2 (N = 12)**	**Score 3 (N = 12)**
T_A1	r = 0.057, p = 0.861		
T_A2		r = 0.358, p = 0.253	
T_A3			r = – 0.215, p = 0.503
D_D1	r = – 0.192, p = 0.550		
D_D2		r = – 0.002, p = 0.996	
D_D3			r = – 0.208, p = 0.517
F_I1	r = – 0.140, p = 0.664		
F_I2		r = – 0.042, p = 0.896	
F_I3			r = – 0.054, p = 0.869

T_A1 – the variable tension – anxiety during test T1, T_A2 – the variable tension – anxiety during test T2, T_A3 – the variable tension – anxiety during test T3, etc.

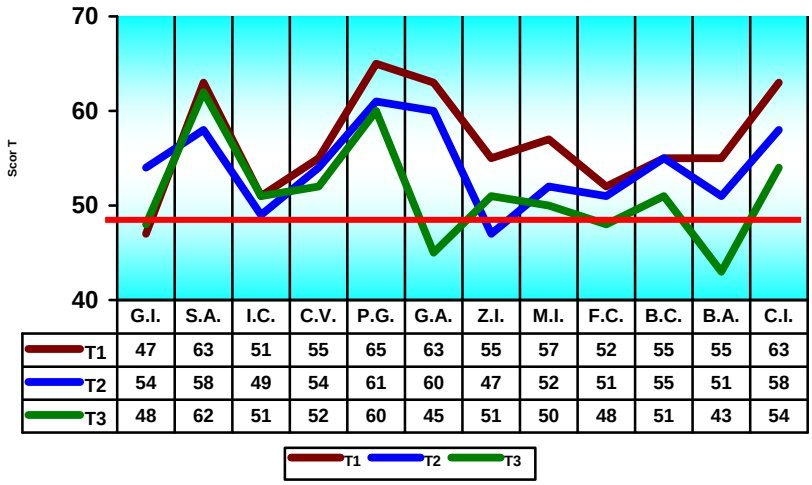

Figure 1 - Evolution of the values for the ***variable T-A***, in the three moments of the testing (initial test - T1, intermediary test - T2, final test - T3)

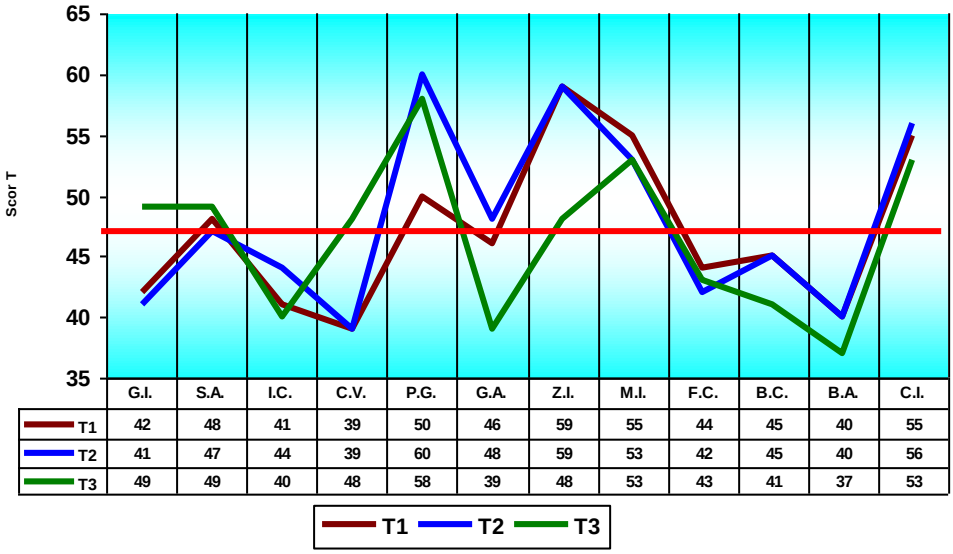

Figure 2 - Evolution of the values for the ***variable D-D***, in the three moments of the testing (initial test - T1, intermediary test - T2, final test - T3)

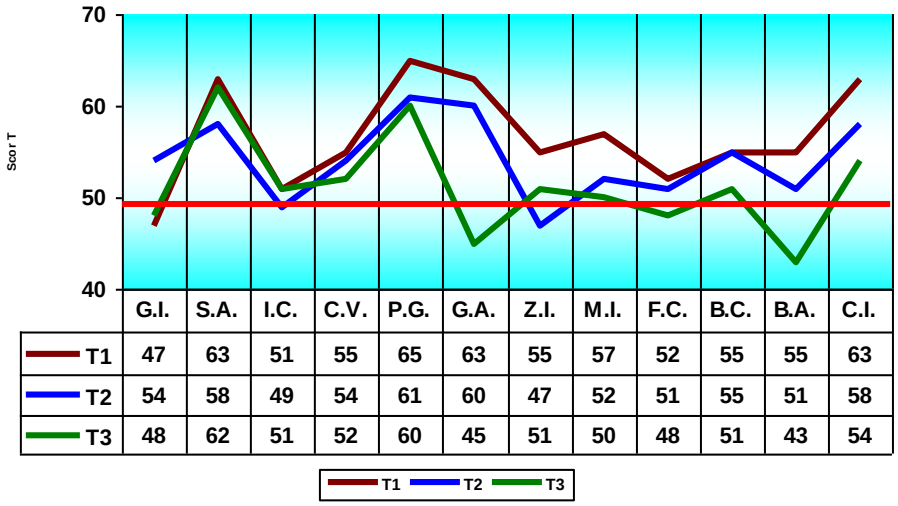

Figure 3 - Evolution of the values for the ***variable F-I***, in the three moments of the testing (initial test - T1, intermediary test - T2, final test - T3)

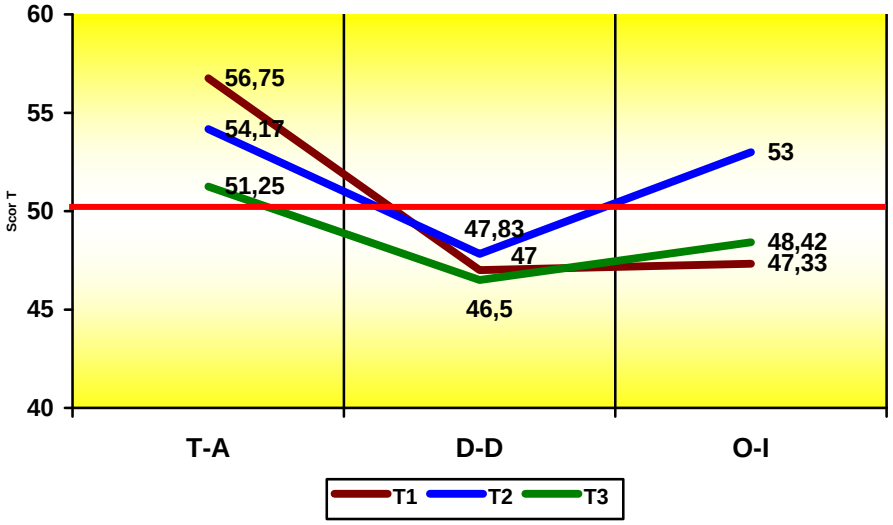

Figure 4 - Comparative analysis regarding the profile of the psycho-affective dispositions in all three tests