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Comparing Concentrated Atention Abilities With Reaction Time Of Football Referees Who Are On Different Classifications

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ABSTRACT

In this study, football referees' concentrated atention abilities are compared with their reaction time who work on different classifications in Turkey. In our research 1286 football referees, comprised study's population, who worked as National Referee, National Assistant Referee, Regional Referee and Regional Assistant Referee in PTT 1. Leage, Spor Toto 2. Leage, Spor Toto 3. Leage and Regional Amatuer Leages classifications which were dependent to Turkish Football Federation in 2014-2015 football season. 121 football referees, comprised sample as research design, who attended to our study and were chosen randomly. In research "Stroop test TBAG form", was used, which was accepted in earlier occasions as golden standart on measurement of concentrated attention levels on basis of reliability and viability and was approved by TÜBİTAK. On measurement of reaction time, New Test Reaction Timer was used. Stroop test scale's reliability coefficient was found 0,98. Results were analysed and commented by using SPSS program. One Way Anova test was used to compare groups who are more than two and Post Hoc Tukey test was used to determine the differences between groups, on analysis of input data. Pearson's corelation test was made in order to survey relations among variables. As a result of research, a meaningful relation which was on negative direction was found between referees' number of reading fixing colors' names which were printed with different colors and time of sound-left hand reaction (r = -,197 ve p<0,05) and also speed of saying neutral words which were printed with different colors and time of light-left hand reaction (r= -,237 ve p<0,01). Also a meaningful relation which was on positive direction was found between referees' number of reading, fixing neutral words which were printed with different colors and time of light-right hand reaction (data) and speed of saying colors' names which were printed with different colors and time of sound-right hand reaction (r=184 ve p<0,05).

KEYWORDS: Football, Referee, Stroop Test, Concentrated Attention, Reaction Time

INTRODUCTION

Football which is mentioned as "era's game" is the most interest attracting sport in the world by in field and out of field participators [1]. Football's position in contemporary life is very important. Management of this sport on playing fiels, which is watched by millions, is made by football referees who were educated on sports basis [2]. A referee's role can not be ignored on starting, finishing well, amusingly, within Fair-Play principles and not playing unorganisedly, disputably, on fighting terms of a football match [3]. In recent years, researches about this issue were risen because football supplement to growth of countries' economy. The studies concentrated on referees' physical, psychological, physiological situation and their performance [4,5]. In scientific studies about referees, movement patterns [6,7] were identified by distances which were traversed by

assistant referees [8], antropometric parameters, hearts' speeds [6,9] and levels of dehydration [10]. But there have not been done any study in order to mesure referees' attention level in our country.

A football referee's ability to show required performance related to game depends on his/her phsical and psychological well-being. Also, although he/she is under phsical and psychological pressure at match, his/her fast deciding steadily during the game is important. At contest, the referee is the only authority to decide according to the position [11]. The referee's doing this function with minimum inaccuracy depends on his/her paying full attention to the game and so concentrating. In Turkish Language Institution's dictionary concentrated attention means a person's paying attention to only one thing. In this situation, it is supposed for the person to pay his/her attention to the job he/she is doing without being influenced by other occasions and people. According to another definition, concentrated attention is: the ability to concentrate to a job or a definite part of an environment and to refuse aversive stimulants. Continuation of attention is the capacity to concentrate the attention for a definite time period [12].

Also, the referee must have speed of reaction in order to make the rightest decision in the shortest time. Reaction time; is a person's hereditary specifity which is the time between stimulant and his/her first muscle reaction or his/her first movement [13].

In our study, the data was struggled to process statistically, which was consisted of concentrated attention levels that was obtained by applying Stroop Test TBAG form to the referees who work in Turkish leages and their reaction time that was measured by using Newtest Reaction Timer 1/1000 equipment. In this concept, our study made able for us to have significant data about removal of defectiveness in this issue, contribution to our country's football and football referee's job.

This dissertation was approved by Fırat University's Presindentship of Non-Interventional Ethical Institution on 11.02.2014 date and with 03/01 number of congress decision.

MATERIAL AND METHOD

Research's Population and Sample:

In our research 1286 football referees, comprised study's population, who worked as National Referee, National Assistant Referee, Regional Referee and Regional Assistant Referee in PTT 1. Leage, Spor Toto 2. Leage, Spor Toto 3. Leage and Regional Amatuer Leages classifications which were dependent to Turkish Football Federation in 2014-2015 football season. 121 football referees from different cities, comprised sample as research design, who attended to our study and were chosen randomly. The referees who attended to this study, read Informed Voluntary Might Be Form (IVBF) and accepted and then they were included.

Measurement Instruments and Equipments:

Visual and Auditory Reaction Time:

Prior to study, in dressing room, reaction measuring equipment was introduced to the sports wearing referees. The items, which may avert on chair sitting sportmen's attention, were precluded and it was supposed for them to use their dominant hands first. On measurement of reaction; New-Test 1/1000 (Reaction timer) equipment was used. This equipment's first part is the button to which the subject is supposed to press according to previously defined auditory (sound) or visual (light) stimulant, the second part is the place in where test applier adjusts number and shape of the auditory or visual stimulants which are sent to subject. During the test, the subject obeys to applier's instructions. This equipment measures visual or auditory simple (one sound, one light) reaction time and visual multiple-choice (one of two light) reaction time. By using New-Test equipment, simple sound-light and multiple-choice light reaction time was measured with sensitivity of 1/1000 [14].

The measurements were made between 09.00-17.00 hours everyday in an ambience which was precluded from items (noise, poor light) which may avert attention. Results of measurements were recorded to entry forms which were prepared for every subject beforehand. Part of New-Test equipment that stands in front of subject was placed 10 cm far away from desk and it was required from subject to put his/her dominant hand on desk. With "Ready!" instruction, it was required from subject to press to buttons when the stimulant, was given, which was one of light or sound and results were recorded to measurement result forms which were prepared previously. 8 measurements were taken from every subject according to sound and light stimulants. First 3 measurement was accepted as orientation and was not included to process, and also of last 5 measurement best and worst results were not included to process, rest 3 measurements' arithmetical mean was taken [15].

Stroop Test:

Stroop Test Application Policy:

"Application was done individually in a silent room in which the items, that may avert attention (noise, poor light), were minimized. In the room, there were a favorably big desk and chairs which could be used

conveniety either by applier or by subject. Cards which would be used for test were placed on the desk regularly and the recordind form was hold in a position in which the subject could not see the results."

The recording form which included the subjects demographic information was filled with subject. Information related with application was written on to special parts of recording form.

"Parts related to Stroop Test, card and application order is defined below.

- ✓ Of colors'names, reading words which were printed black (1. Card),
- ✓ Of colors' names reading words which were printed colored (2. Card),
- ✓ Saying shapes' names (3. Card),
- ✓ Saying words' colors, which are not colors' names, were printed colored (4. Card),
- ✓ Saying words' colors, which are of colors' names, were printed colored (2. Card)."

In every part, chronometer was started after giving "Start!" instruction to subject, was stopped when subject finished last entry. After finishing that part the time was registered to place which was defined for this on record form and the process was repeated for every part.

In every part, the reactions were pursued on record form if they were true or not, words which were read incorrectly or colors which were said incorrectly were registered to their place on record form. So, over the letter that is related with incorrect reaction was drawn a slash (/). Entries that were revised by subject of his/her own accord were circled (O). When applications related with Stroop Test TBAG Form finishes, errors' amounts and correntions' amounts of every part were counted and written to their place on record form.

Record form and the cards that were not being used at that instant were hold out of subject's view and changing card process was done in a style that subject was not able to see [16].

Scoring of Stroop Test:

"Every part of Stroop Test TBAG Form was pointed in three ways: (1) used time between "Start!" instruction and reading/saying last topic of part; (2) errors' amount; (3) corrections' amount.

When an application related with the part was finished, time, which was used to finish part and was read on the chronometer, was recorded to the place on record form. Processes related to time was done repeatedly after every part.

When the applications related with Stroop Test TBAG form were finished, incorrect reactions on which were drawn a slash on record form were counted. Every parts' errors' amounts were written to their place on record form. Subject's corrections were not included to errors' amount. Subjects' corrections which were circled on record form were counted and every part's corrections' amounts were written to their place on record form.

Maximum scores of Stroop Test were defined as: For every part "0" error score, "0" correction score and for reading/saying color within the most shortest time as much as possible. Stroop Test's Application Time was 10 münutes [16]."

Personal Information Form:

Personal information form was composed of questions which were aimig to identify classification attributes of referees who attended to this research. This form was prepared by researcher.

Analysis of Data:

Obtained data was analysed with SPSS program. On analysis of data One Way Anova was used for descriptive statistics, comparison of groups which were more than two (according to the referees' classification, on stroop test parts, for determining reaction time of right hand and left hand, light and sound) and Post Hoc Tukey test was used for determining differrences between groups.

Corelation test was done on observation of relations between football referees' concentrated attention abilities and their reaction time (Pearson product-moment corelation coefficient). At the end of research a table was made of the obtained data and was eveluated on basis of literature.

Diagnoses:

All the data obtained from personal information form, reaction time chronometer and Stroop Test TBAG Form was analysed with SPSS program.

Pearson product-momet corelation coefficient technique was used for analysis of relation between the referees' concentrated attention abilities and their reaction time.

Without taking in to consideration the referees' personal characteristics, their Stroop Test TBAG Form and reaction test scores' average ($\overline{X}$) and standart deviation (sd) values were calculated.

*Significance level was accepted as ,05 all over the statictical calculations.

Differences between independent variable groups (categories) were accepted "significant" when significance level was noticed smaller than ,05 ($p<.05$) and results were eveluated in this concept.

Diagnoses of Comparison of Reaction Time According to Referee Classifications:

The diagnoses of reaction time of referees who work in different classifications were given on Table-1. Also, it was tested with ANOVA if there was a diffrence between referees' reaction time of light and sound and referees' classifications.

According to table 1, the referees' reaction time was campared on basis of their classification and it was defined that Regional Referees' light right hand ($\overline{X}$=.2333 sn), light left hand ($\overline{X}$=,2300 sn) and sound right hand ($\overline{X}$=,2296 sn) reaction time was the best, National Referees' sound left hand ($\overline{X}$=,2450 sn) reaction time was the lowest.

Table 1: Descriptive Statistics Of Reaction Time of Referees Who Work in Different Classifications

	Classification	N	A.O.($\overline{X}$)	S.S.	The Lowest	The Highest
Light Reaction test Right hand	UH	14	,2800	,08010	,14	,37
	UYH	36	,2728	,07655	,12	,38
	BH	27	,2333	,07055	,12	,36
	BYH	44	,2377	,06678	,11	,38
Sum		121	,2521	,07386	,11	,38
Light Reaction test Left hand	UH	14	,2743	,07165	,12	,38
	UYH	36	,2708	,06092	,15	,39
	BH	27	,2300	,06257	,13	,35
	BYH	44	,2641	,06514	,12	,39
Sum		121	,2597	,06538	,12	,39
Sound Reaction Test right hand	UH	14	,2543	,07542	,15	,35
	UYH	36	,2667	,06998	,15	,39
	BH	27	,2296	,06728	,12	,35
	BYH	44	,2468	,06737	,12	,38
Sum		121	,2498	,06953	,12	,39
Sound Reaction Test left hand	UH	14	,2450	,07930	,13	,38
	UYH	36	,2686	,06316	,12	,39
	BH	27	,2526	,06061	,14	,36
	BYH	44	,2491	,06647	,12	,39
Sum		121	,2552	,06561	,12	,39

Evaluation of Stroop Test Scores According to Referee Classification:

Results of descriptive statistics and variance analysis belong to Stroop test results of referees who work in different classifications are given below.

According to Stroop test whose aim was to identify level of concentrated attention; there could not be found an evident difference among finishing time of first part of referees who work in different classifications (table 2). Also, it was noticed that they did not any errors and corrections.

Table 2: Stroop Test's Evaluation of 1. Part

Classification	Numbe r	The Lowest (s)	The Highest (s)	Error Amount	Correction Amount	A. O.($\overline{X}$)	ss
UH	14	6,14	9,12	0	0	7,3236	,97778
UYH	36	3,97	10,43	0	0	7,3894	1,2174
BH	27	5,24	8,86	0	0	7,0359	,72435
BYH	44	5,26	10,71	0	0	7,3698	1,0605
Sum	121	3,97	10,71	0	0	7,2958	1,0355

According to Stroop test whose aim was to identify level of concentrated attention; on comparison of difference among finishing time of 2. part of referees who work in different classifications, best score belongs to Regional referees ($\overline{X}$= 7.5337±0.879). Also it was noticed that highest error and correction scores belong to Regional Assistant Referees (Table 3).

Table 3: Stroop Test's Evaluation of 2. Part

Classification	Number	The Lowest (sn)	The Highest (sn)	Error Amout	Correction Amount	A. O. ($\overline{X}$)	ss
UH	14	6,57	9,37	0	0	8,1714	,82221
UYH	36	6,11	10,37	0	2	8,1808	1,02580
BH	27	5,92	9,10	0	1	7,5337	,87907
BYH	44	6,21	17,26	4	6	8,1084	2,03624
Sum	121	5,92	17,26	4	9	8,0090	1,44904

According to Stroop test whose aim was to identify level of concentrated attention; on comparison of difference among finishing time of 3. part of referees who work in different classifications, best score belongs to Regional referees ($\overline{X}$= 9.3504 ± 1.089). Also it was noticed that the highest correction scores belong to Regional Assistant Referees (Table 4).

Table 4: Stroop Test's Evaluation of 3. Part

Classification	Number	The Lowest (s)	The Highest (s)	Error Amount	Correction Amount	A.O.($\overline{X}$)	ss
UH	14	8,43	13,84	0	0	10,1429	1,3997
UYH	36	6,24	11,40	0	1	9,6769	1,1471
BH	27	7,26	11,50	0	1	9,3504	1,0890
BYH	44	7,52	15,20	0	2	10,0248	1,6156
Sum	121	6,24	15,20	0	4	9,7845	1,3678

According to Stroop test whose aim was to identify level of concentrated attention; on comparison of difference among finishing time of 4. part of referees who work in different classifications, the best score belongs to National Referees ($\overline{X}$= 12.05 ± 1.31). Also on comparison of all referees' first third part with fourth part, it was noticed that error and correction scores increased (Table 5).

Table 5: Stroop Test's Evaluation of 4. Part

Classification	Number	The Lowest (sn)	The Highest (sn)	Error Amount	Correction Amount	A. O. ($\overline{X}$)	ss
UH	14	10,51	15,06	3	3	12,0557	1,31816
UYH	36	9,21	17,80	2	3	13,1242	2,24990
BH	27	10,12	18,90	2	3	12,8907	2,19073
BYH	44	9,21	21,00	4	3	13,1016	2,33105
Sum	121	9,21	21,00	11	12	12,9402	2,18246

According to Stroop test whose aim was to identify level of concentrated attention; on comparison of difference among finishing time of 5. part of referees who work in different classifications, the best score belongs to National Referees ($\overline{X}$= 22.40 ± 3.55).

On comparison of all referees' first fourth part with fifth part, error and correction amounts increased (Table 6). Also it was noticed that the highest error and correction score belongs to Regional Assistant Referees (Table 6).

Table 6: Stroop Test's Evaluation of 5. Part

Classification	Number	The Lowest (sn)	The Highest (sn)	Error Amount	Correction Amount	A. O. ($\overline{X}$)	ss
UH	14	16,28	28,90	4	5	22,4071	3,5581
UYH	36	18,26	29,65	4	4	22,5867	3,1284
BH	27	16,87	28,53	4	3	23,8241	3,1043
BYH	44	15,40	29,44	5	7	23,6018	3,5984
Sum	121	15,40	29,65	17	19	23,2112	3,3591

Table 7: Results of Variance Analysis of Reaction Time That Belongs to Referees Who Work in Different Classifications

Variance Sources		KT	Sd	KO	F	P
Light_reaction Test Right hand	Between Groups	,045	3	,015	2,871	,039
	Within Group	,610	117	,005		
	Sum	,655	120			
Light_reaction Test Left hand	Between Groups	,032	3	,011	2,604	,055
	Within Group	,481	117	,004		
	Sum	,513	120			
Sound Reaction Test Right hand	Between Groups	,022	3	,007	1,530	,210
	Within Group	,558	117	,005		
	Sum	,580	120			
Sound Reaction Test Left hand	Between Groups	,010	3	,003	,751	,524
	Within Group	,507	117	,004		
	Sum	,517	120			

As it is seen on Table 7, it was not noticed any meaningful difference among reaction time of referees who work in different classifications [p>0.05]. Due to absence of meaningful difference among groups, Post Hoc Test statistic was not done.

Diagnoses About Relations Between Referees' Concentrated Attention Abilities and Their Reaction Time:

Corelation between Referees' Stroop Test parts finishing time, error amounts and correction amouts and sound and light reaction time is shown at Table 8.

Table 8: Corelation Test of Relation Between Football Referees' Concentrated Attention and Their Reaction Time (N=121)

Part	Variable		Light Right	Light Left	Sound Right	Sound Left
Part 1	Time (sn)	r	-0,41	0,107	-0,021	-0,046
		p	0,655	0,244	0,823	0,617
	Error Amount	r	-	-	-	-
		p	-	-	-	-
	Correction Amount	r	-	-	-	-
		p	-	-	-	-
Part 2	Time (sn)	r	0,011	-0,027	-0,013	-0,066
		p	0,904	0,768	0,888	0,471
	Error Amount	r	-0,072	-0,140	-0,146	0,029
		p	0,430	0,124	0,111	0,751
	Correction Amount	r	-0,041	-0,143	-0,094	-0,197*
		p	0,655	0,117	0,306	0,030
Part 3	Time (sn)	r	0,131	0,153	0,070	0,056
		p	0,151	0,094	0,445	0,539
	Error Amount	r	-	-	-	-
		p	-	-	-	-
	Correction Amount	r	0,012	0,022	0,039	0,086
		p	0,895	0,815	0,670	0,346
Part 4	Time (sn)	r	-0,040	-0,237**	-0,144	-0,176
		p	0,663	0,009	0,114	0,053
	Error Amount	r	0,064	0,023	0,031	0,062
		p	0,482	0,800	0,737	0,496
	Correction Amount	r	0,184*	0,034	0,139	0,030
		p	0,043	0,711	0,129	0,741
Part 5	Time (sn)	r	0,176	-0,073	0,184*	-0,051
		p	0,053	0,424	0,044	0,582
	Error Amount	r	0,092	0,009	0,019	-0,070
		p	0,313	0,921	0,833	0,447
	Correction Amount	r	-0,152	-0,083	-0,101	-0,139
		p	0,097	0,365	0,268	0,127

* Relation is meaningful at 0,05 level.
** Relation is meaningful at 0,01 level.

Part 1 (1. Card: black printed color names), referees had read at an average of 7,29 ± 1,03 second level (Table 2). There was not noticed any meaningful relation between referees' speed of reading color names on card and their reaction to light or sound(p<,05).

Part 2 (2. Card: color names which were printed with different colors), it was read at 8,00 ± 1,44 second by referees who attended to research (Table 3). A meaningful relation which was on negative direction was found between referees' reading correcting number of color names which were printed with different colors and their sound left hanf reaction time (r = -,197 ve p<0,05). According to this, when referees' correcting number of color names which were printed with different colors increases, then their sound left hand reaction time decreases (or vice versa).

Part 3 (3. Card: Colored Printed Circles), it was said by referees at an average of 9,78 ± 1,36 second level (Table 4). There was not noticed any meaningful relation between referees' speed of reading color names on card and their right-left hand light or right-left hand sound reaction (p<,05).

Part 4 (4. Card: Colored Printed Neutral Words) it was said by referees at an average of 12,94 ± 2,18 second level (Table 5). A meaningful relation which was on negative direction was found between referees' speed of reading of colored printed neutral words and their light left hanf reaction time (r= -,237 ve p>0,01). According to this, when referees' speed of reading of colored printed neutral words decreases (time increases), then their light left hand reaction time decreases (or vice versa).

A meaningful relation which was on positive direction was found between referees' amount of correcting of colored printed neutral words and their light right hand reaction time (r=,184ve p<0,05). According to this, when referees' amount of correcting of colored printed neutral words decreases, then their light right hand reaction time decreases (or vice versa).

Finally, Part 5 (2. Card: Color names which were printed with different colors), it was said by referees at an average of 23,21 ± 3,35 second level (Table 6). A meaningful relation which was on positive direction was found between referees' time of saying of color names which were printed different colors and their sound right hand reaction time (r=,184ve p<0,05).

According to this, when referees' time of saying of color names which were printed different colors increases, then their sound right hand reaction time increases (or vice versa).

Argument:

Football which is mentioned as "era's game" in the world, especially in Europe it is the most interest attracting sport by direct and indirect participators, the referee directs this sport branch. A football referee is supposed to respond to phsical requirements which are expected of him/her in order to present a good performance during the competition. Also, although he/she is under phsical and psychological pressure at competition, his/her fast deciding steadily during the game is important. Due to this reason, the referees' concentration time and reaction time are very important.

Referees' reaction time to sound and light were compared on basis of their classifications. According to this, referees' right hang light reaction time is ,2521 s averagely, left hand light reaction time is ,2597 s averagely, right hand sound reaction time is ,2498 s averagely and left hand sound reaction time is ,2552 s averagely. Difference in reaction time depends on stimulants' kind (auditory and visual) and their response to stimulants. In this study it was noticed that auditory (sound) and visual (light) reaction time were different. Kosinski found reaction time to light 0,19 s and to sound 0,16 s averagely [17]. So, reaction time to sound is shorter than to light. The results that support these data were obtained also in our study.

In comparison of referees' reaction time on their classification basis, it was determined that Regional Referees' light right hand (=.2333 s), light left hand (=,02300 s) and sound right hand (=,2296 s) reaction time as the best, National Referees' sound left hand (=,2450) reaction time as the lowest. There was not found any meaningful relation between reaction time of referees who work in different classifications [$p>0.05$]. Due to absence of a meaningful relation, post-hoc test statistic was not done.

In study of distinguished football players' reaction time, it was found that their right hand visual (light) reaction time as 0.21 s, auditory reaction time as 0.17 s, left hand visual reaction time as 0.20 s, auditory reaction time as 0.17 s [18]. Visual (light) reaction time values are close to our study's results.

On results of distinguished gymnasts' reaction test, their visual reactions were found as 0.232±0.34 s, auditory reactions as 0.215±0.25. Those obtained data was close to results which we found in our study [19].

On inspection of Finland's football player groups' light hand and sound hand reaction time values, who played in 1. and 3. leage and whose age average was 22,8±4.6 and 21.33.8, it was determined a meanigful relation in first leage's players' favour (1. Leage's players' light; 0.194±17 s, sound; 0.194±17 s, 3. Leage's players' light 0.216±15 s, sound 0.153±15 s). The obtained data are not parellel to our diagnoses [20]. On comparison of referee's classifications, there was not any meaningful reaction between visual and auditory reaction time. With this result, it should not be determined that their reaction time is poor. Relation between reaction time may not be found due to different sportmen's different reaction time values on different reaction time.

In our study whose aim was inpecting relations between concetrated attention abilites and reaction time of referees who work in different classifications in order to measure referees' concentrated attention abilities there was used Stroop Test TBAG form which was evolved to inspect complicated attention, reaction inhibition/ resistance to disturbing stimulant and speed of processing and also which is sensitive to frontal lob's functions. It was evaluated for complicated attention Stroop Test with parts 1-4, for resistance to disturbing stimulant Stroop Test with part 5.

On inspection of descriptive statistics about referees' concentrated attention levels, on all classifications their test finishing time increased from Stroop test 1. part through 5. part. Also there was a general increase in number of errors and corrections. If it is taken in to consideration that application test batery became complicated gradually and disturbing stimulant rised, it may be told that this result is an expected one. On going higher levels of test, there was observed a positive result on national referees' favour, while there was observed a negative result on regional referees' favour. Espacially on highest level of test (5. Part) Regional Assistant Referees have the highest scores of error and correction number. We may explain this situation by that they are at start of their career and inexperienced. If it is taken in to consideration that internal and external reasons influenced their concentration time, it may be said that their shortage of experience and education and age factor caused this situation.

On inspection of descriptive statistics data of concentrated attention level among referees' classifications, while a definite difference can not be absorved on 1. part, the best finishing score of 2. and 3. part belongs to Regional Referees and the best finishing score of 4. And 5. Part to National Referees. On all classifications, on all parts of test, an increase was observed respectively at error and correction number score. On 5. part Regional Assistant Referees have the highest error and correction number score. Related with subject, National Referees' finishing time of 5. part was better than the ones' on other classifications. We may relate this positive result to their vocational experience, in spite of test battery's highest level of disturbing stimulants (the best resistance to disturbing stimulants).

National Referees' finising time of 5. Part was measured as 22,4 ± 3.55 s. This value is lower than all referees' finishing time average. So it may be said that national referees present the best resistance to disturbing stimulants.

Regional referees' finishing time of 1. Part measured as 7.03 ± 0.72 s, finishing time of 2 part as 7.53 ± 0.87 and finishing time of 3. Part as 9.35 ± 1.08 s. These values are lower than referees' average. So, regional referee are more successful on basis of complicated attention. It may be said that this result is turned up by the matches which are directed by these referees' are semi-professional, and players, fans, technical teams etc. are of a different temperament.

Results of Stroop test's average finishing time's, error and correction amounts' comparison with literature, it is observed that better scores were taken on basis of test which was applied to sportmen. For example, on application of this test to judo sportmen who were under stress, it is reported that their average finishing time as 74,4 s and error amounts as 2,1 [21].

On inspection of variance analysis' results of comparison of referees' stroop test part finishing time, who are on different classifications, due to absence of any meaningful relation between classifications, post-hoc test statistics was not done.

On inspection of corelation test between football referees' concentrated attention abilities and reaction time, referees had read Stroop test 1. Part at an average time of 7,29 ± 1,03 seconds, there was not found any meaningful relation between referees' speed of reading colors' names on cards and their reaction to light or sound (p<,05).

On Stroop test 2. Part, between referees' reading/correcting colors' names which were pirinted with different colors and sound left hand reation time there was found a meaningful relation which was on negative direction (r = -,197 ve p<0,05). According to this, while referees' speed of reading colors' names that were printed with different colors decreases (time decreases???), sound left hand reaction time increases (or vice verse). It may be said this situation derives from all referees use dominant hand (right hand). It is known that in the study %85 of referees use their right hand. On some of battery's parts there was found positive corelation between participants' finishing time or correction amount and right hand reaction time. While referees' time or correction amount decreases, thus their abilities to reject disturbing stimulants increase, at the same time their reaction time seems good. This situation which may be related to their majority using right hand can be stated as their ability to present reaction and despite any disturbing stimulants deciding correctly on positions during the competition.

Referees finished stroop test 3. Part at an average time of 9,78 ± 1,36 seconds. There was not found any meaningful relation between referees' speed of saying colors on cards and left-right hang light or right-left hand sound reactions (p<,05).

Stroop test 4. Part was finished at an average time of 12,94 ± 2,18 seconds by referees who attended to the research. There was found a meaningful relation on negative direction between referees' speed of saying neutral words which were printed colorful and light left hand reaction time (r= -,237 ve p>0,01). According to this, while referees' speed of saying neutral words which were printed colorful decreases (time decreases), their light left hand reaction time increases (or vice verse). Measuring complicated attention on this test battery, referees' affirmative results to disturbing stimulants are related to negative result of light left hand reaction time. This situation may be explained with usage of dominant hand. There was found a meaningful relation on positive direction between referees' correction amount of neutral words which were printed colorful and light right hand reaction time (r=,184ve p<0,05). According to this, while referees' saying speed of neutral words which were printed colorful decreases (time increases), their light right hand reaction levels increase (or vice verse). Of affirmative relation between amount of correcting neutral words and light right hand reaction time of participants whose majority uses their right hand, it may be stated that with their complicated attention abilities referees can present reaction to positions in a short time. This fact may be accepted a useful condition which will contribute positively to competition.

Lastly, on stroop test 5. Part, there was found a meaningful relation on positive direction between participant referees' saying speed of colors' names which were printed with different colors and their sounf right hand reaction time (r=184 ve p<0,05). According to this, while referees' saying speed of colors' names which were printed with different colors increases (time decreases), their sound right hand reaction time increases (or vice verse). Affirmative relation of referees' resistance to disturbing stimulants and their reaction time shows that referees present fast reactions to situations (situations of positions, players' behaviours, fans etc.) with which they encounter during the competition and it may be said that this will contribute positively to competition.

On inspection of stroop test parts of reading colors' names which were printed black (1. Card), reading colors' names which were printed colorful (2. Card), saying shapes' colors (3. Card), saying neutral words' names which were printed colorful (4. Card) and saying colorful printed colors' names whose meaning are different colors (5. Card) there was noticed that parts' contents and measured cognitive areas present differences. Influence of these differences to finishing time was expected and at the end of measurement there were established differences on basis of time among parts. It may be said that this situation derives from Stroop test's content's struction. At the same time, of right and left hand reaction time there were differences among part finishing time on basis of part contents, also these differences were observed on both right and left hand. It

may be said that right and left hand do not have any influence on difference among parts on basis of part finishing time.

It was noticed that studies that measure sportmen's and referees' contcenrated attention abilities are limitted in literature. So, the obtained data was not be able to be compared with different sportmen's or referees' groups. We surmise that our study will light the way for similar studies which will be done henceforward.

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