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CHI SQUARE TEST APPLIED ON BETA AVERAGE MATRICES OF BIORHYTHMIC

TRENDS OBSERVED IN CLASSIFIED GROUPS

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ABSTRACT

It is known that any performing object is, in gross, subjected to its activities and results thereof which are collectively contributed to its own level emotional, intellectual and physical at that time. These levels control activities and hence performance. The main aspect of this research paper deals with judging the present level of a subject as a beta Average of the three levels and then associating to each one a real value we shall call it a performance indicator which predicts, using expected E function, its achievement on a stipulated day. These subjects are tested on real examinations on the same stipulated days and justified for their performance on a scale out of 100. Chi-Square Test has been implemented to verify the goodness of fit and corresponding null hypothesis at a given level of significance justifies the strength of the null hypothesis. Discrepancies observed have been partially attributed to many subordinate features and it is expected to lead to some latent effects of some additional Para psychological levels still not known comprehensively. Remedial prognosis to diminish the proportion of discrepancies may be counselling which may possibly and effectively restructure the performance level.

KEYWORDS: Emotional Biorhythmic Cycle, Intellectual Biorhythmic Cycle, Physical Biorhythmic Cycle, Sinusoidal Function, Spiritual Biorhythmic Cycle

Abbreviations:

PCA: Principle component analysis. χ^2 - (chi-square) Test

INTRODUCTION

It is claimed that and ambitious researchers working with the same target have, after years of profound dedication, have been successful to find that a living being ,in gross, is subjected to act and is reflected to act in concurrence of three main governing factors; we call them as biorhythmic levels. These levels are a part of a living organism identified all its course of actions grossly zipped in biorhythmic clock not completely known but many researchers in the pertaining area have interpreted as a pre – defined and pre – ordained genetically well-defined program devised to operate on a body for fixed interval. We call the interval as a time slot between birth and death. This is a master program which operates in a body of any leaving creature through different master glands like pineal, pituitary, and adrenal and some more, residing in a body and continuously secreting hormones and conveying messages through neurons. The active presence of the function is experienced through the heartbeat transmitting its action and sending its reaction- i.e. afferent and efferent activities through the salient features of senses like eyes, ears, tongue, nose and(external feeling of)touch.

They, in accordance and in well-designed pattern, leave the messages to the mental and cognitive active domain.

Their combined effect into converge to produce some proportional signal to the reactive system. This system- we shall know it as an emotional system-, on experiencing the effect, approach or refers to the next higher in order decision-making authority we will know it an intellectual level, for counter action and releases order that is surpassed to different physical organs with probably further operational instructions.

Study on the subject conducted on different domains, physical, emotional and intellectual suggested that each subject is collectively governed living. Surpassing these three major factors (Emotional, Intellectual, and Physical). as the researchers claim, one more silent factors called spiritual factor which, as claimed, dominates all the above said three factors and can control and activates any one or more of them and instruct them to rectify their functional and behavioural pattern in situations. There are, as claimed, other factors too, but we depart company from them making a single statement that, if any such external reliable system exists then its submission will be through the organs consistent and capable of receiving also transmitting the proper signals of the message to react. The living creature is a gross product of all these four dominant factors. We shall discuss the first three major factors only- namely Emotional Level, Intellectual Level, and Physical Level. The reason for the spiritual factor, though main and master one not being considered for discussion, is that its functional pattern is not known and defined on a life span. So, we conclude that, as discussed and concluded above, any living creature is subjected to three cycles. The biorhythmic clock is responsible for running, operating and to some extent partially control these three cycles and vice-versa.

Operational Features

To analyze all that we have discussed above, we focus on its mathematical aspect and stepwise approach its rigour. As studied and proved statistically that according to the aspect of personality there are mood swings-periodic in nature and performance in critical activates (the later part we already discussed in detail)

Performance indicator time cycles are of different time span and reflect current state and its impacts on the events of real life. Beginning from the **dot time** its existence the cycle begins but we shall consider the cycle from the date of birth and extend it gradually and periodically till date of performance

According to this theory of biorhythms, there are three distinct but overlapping sinusoidal cycles of intensity of activity in regard to three different aspects of the human personality. These are graphed as shown,

Table 1: Personality- Biorhythmic Calculator

Type of Personality	Period of Cycle	Formula for Biorhythm
Emotional	28	$\sin\left(\frac{2\pi d}{28}\right)$; d = Days till date.
Intellectual	33	$sin\left(\frac{2\pi d}{33}\right)$; d = Days till date.
Physical	23	$\sin\left(\frac{2\pi d}{23}\right)$; d = Days till date.
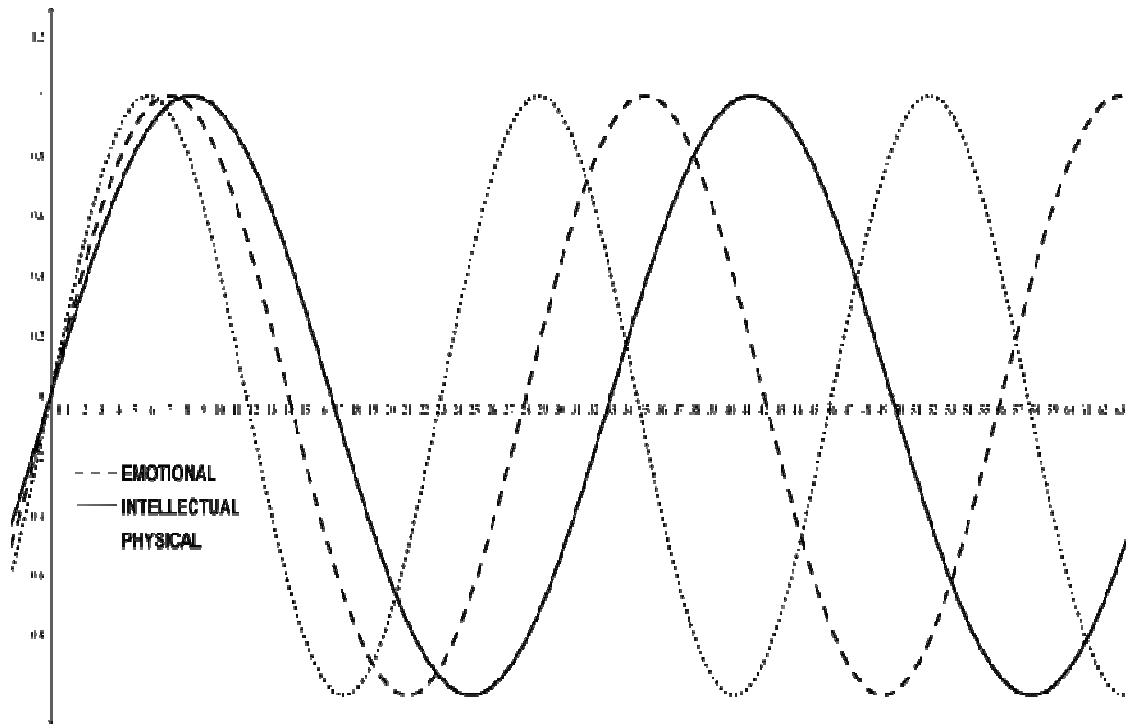
Horizontal Axis indicates Numbers of days and Vertical Axis indicates Value of Cycle.

Graph: 01 Emotional, Intellectual and Physical Biorhythms Cycles.

Pedagogy: In order to verify and assess the claim we adopt the following order of execution.

Step 01: Defining Classes.

Step 02: Calculating beta average Matrix.

Step 03: Generating Expected Matrix from Beta Average biorhythmic Matrix.

Step 04: Matrix of Actual marks.

Step 05: χ^2- Test.

Step 01: Defining Classes

We define three different classes of students based on aggregate performance of previous five years

Class-01 [C1]: Average students. [35 to 54 Marks]

Class-02 [C2]: Above average students. [55 to 79 Marks]

Class-03 [C3]: Best Performing students. [80 to 100 Marks]

We have randomly selected three students from each class defined above. We have, according to mathematically predefined formula, enlisted three types of observations of three different biorhythms for three consecutive days of each student of the three classes defined above. As understood and observed, these biorhythmic cycles originate from the birth date that ceaselessly operate in some order till the date of death. These observations are the real values that remain in [-1, 1] interval and their combined representative figure is calculated using beta average as shown.

Table 2: Biorhythmic Values of Three Randomly Selected Students from Each Class

Class	Student No	Date of Birth	Date of Bio Rhythms	Days Till Date	P	I	E	Beta AveRAGE $\beta=\frac{(P+4I+E)}{6}$
C1	1	15-03-98	13-10-16	6787	0.5196	-0.8660	0.6235	-0.3868
	2	15-07-98	13-10-16	6665	-0.9791	-0.1893	0.2225	-0.2523
	3	13-06-98	13-10-16	6697	0.8879	-0.3717	0.9010	0.0504
C2	4	02-09-98	13-10-16	6616	-0.8170	0.0951	0.9749	0.0897
	5	01-08-98	13-10-16	6648	0.2698	0.2817	0.4339	0.3051
	6	02-06-98	13-10-16	6708	-0.8170	0.9898	-0.4339	0.4514
C3	7	19-01-98	13-10-16	6842	0.1362	0.8660	0.7818	0.7303
	8	20-02-98	13-10-16	6810	0.5196	0.7557	0.9749	0.7529
	9	22-01-98	13-10-16	6839	0.8170	0.9989	1.0000	0.9687
C1	1	15-03-98	14-10-16	6788	0.7308	-0.9450	0.4339	-0.4359
	2	15-07-98	14-10-16	6666	-0.8879	0.0000	0.4339	-0.0757
	3	13-06-98	14-10-16	6698	0.9791	-0.1893	0.9749	0.1995
C2	4	02-09-98	14-10-16	6617	-0.9423	-0.0951	0.9010	-0.0703
	5	01-08-98	14-10-16	6649	0.5196	0.0951	0.2225	0.1871
	6	02-06-98	14-10-16	6709	-0.9423	0.9450	-0.6235	0.3690
C3	7	19-01-98	14-10-16	6843	-0.1362	0.7557	0.6235	0.5851
	8	20-02-98	14-10-16	6811	0.7308	0.6182	1.0000	0.7006
	9	22-01-98	14-10-16	6840	0.6311	0.9898	0.9749	0.9276
C1	1	15-03-98	15-10-16	6789	0.8879	-0.9898	0.2225	-0.4748
	2	15-07-98	15-10-16	6667	-0.7308	0.1893	0.6235	0.1083
	3	13-06-98	15-10-16	6699	0.9977	0.0000	1.0000	0.3329
C2	4	02-09-98	15-10-16	6618	-0.9977	-0.2817	0.7818	-0.2238
	5	01-08-98	15-10-16	6650	0.7308	-0.0951	0.0000	0.0584
	6	02-06-98	15-10-16	6710	-0.9977	0.8660	-0.7818	0.2808
C3	7	19-01-98	15-10-16	6844	-0.3984	0.6182	0.4339	0.4180
	8	20-02-98	15-10-16	6812	0.8879	0.4582	0.9749	0.6160
	9	22-01-98	15-10-16	6841	0.3984	0.9450	0.9010	0.8466

P: Physical Biorhythms, I: Intellectual Biorhythms, E: Emotional Biorhythms.

Step 02: Generating Matrix of beta Average Based on Biorhythms

Let us consider Expected Bio Rhythmic Matrices based on readings of Table No: 02

Beta Average Bio Rhythmic Matrices				
		Date		
		13 Oct 2016	**14 Oct 2016**	**15 Oct 2016**
C1	Student-01	-0.39	-0.44	-0.47
	Student-02	-0.25	-0.08	0.11
	Student-03	0.05	0.20	0.33
		Date		
		13 Oct 2016	**14 Oct 2016**	**15 Oct 2016**
C2	Student-01	0.09	-0.07	-0.22
	Student-02	0.31	0.19	0.06
	Student-03	0.45	0.37	0.28
		Date		
		13 Oct 2016	**14 Oct 2016**	**15 Oct 2016**
C3	Student-01	0.73	0.59	0.42
	Student-02	0.75	0.70	0.62
	Student-03	0.97	0.93	0.85

Step 03: **Generating Expected Matrix from Beta Average Biorhythmic Matrix**

Now we will convert this Beta Average Biorhythmic Matrix into Expected Matrix of Marks using the following real function E.

$E: [-1,1] \rightarrow [0,100]$ .Defined as E(b_{ij}) = e_{ij} = $\frac{(b_{ij}+1)*(100)}{2}$; Where $b_{ij} \in [-1,1]$ and $e_{ij} \in [0,100]$

b_{ij} = biorhythmic value extracted from i^{th} row and j^{th} column biorhythmic matrix.

e_{ij} = Expected marks of the corresponding b_{ij}.

		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
	Student-01	31	28	26	85.00
C1	Student-02	37	46	55	138.00
	Student-03	53	60	67	180.00
Total		**121.00**	**134.00**	**148.00**	**403.00**
		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
	Student-01	54	46	39	139.00
C2	Student-02	65	59	53	177.00
	Student-03	73	68	64	205.00
Total		**192.00**	**173.00**	**156.00**	**521.00**
		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
	Student-01	87	79	71	237.00
C3	Student-02	88	85	81	254.00
	Student-03	98	96	92	286.00
Total		**273.00**	**260.00**	**244.00**	**777.00**

Expected Matrices

Step 04: Matrix of Actual Marks

Now we consider the matrix of actual marks obtained by all these students on examinations taken by the students on three consecutive days. (13th, 14th and 15th of October 2016).

		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
	Student-01	32	27	26	85.00
C1	Student-02	36	46	52	134.00
	Student-03	52	60	66	178.00
Total		**120.00**	**133.00**	**144.00**	**397.00**
		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
	Student-01	53	45	39	137.00
C2	Student-02	66	59	53	178.00
	Student-03	72	68	65	205.00
Total		**191.00**	**172.00**	**157.00**	**520.00**
		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
	Student-01	88	80	72	240.00
C3	Student-02	89	86	81	256.00
	Student-03	97	96	92	285.00
Total		**274.00**	**262.00**	**245.00**	**781.00**

Step 05: χ^2 - Test

We are now ready to apply χ^2 - Test .So, considering it on each Class individually.

χ^2 - Test for Class -1

Null Hypothesis H_0 : That there is no difference between the frequencies of the two classes.

Alternative Hypothesis H_1 : Discrepancies claim no goodness of fit.

Level of Significance: α = 0.05.

Now to apply χ^2 - Test let us consider χ^2 - values from above Expected and Observed Matrices.

$$\chi^2 = \sum_{i=1}^{i=n} \frac{(o_i - e_i)^2}{e_i}; \text{ n} = 3.$$

		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
C1	Student-01	0.0323	0.0357	0.0000	0.07
	Student-02	0.0270	0.0000	0.1636	0.19
	Student-03	0.0189	0.0000	0.0149	0.03
	Total	**0.08**	**0.04**	**0.18**	**0.29**

According to the formula stated above, the value of χ^2 found from the above total is,

(Calculated) χ^2 = **0.29**.

Table Value of χ^2 at α = 0.05 at (3-1) * (3-1) =4 degree of freedom is equal to **9.488**

Conclusion: The calculated value of χ^2 falls in acceptance region and hence we accept Null Hypothesis H_0

Claiming that, there is no difference between the frequencies of both the groups under consideration. The said observed difference can be strongly attributed to some unknown factor that is responsible for this cause.

χ^2 - Test for Class -2

Null Hypothesis H_0 : That there is no difference between the frequencies of the two classes.

Alternative Hypothesis H_1 : Discrepancies claim no goodness of fit.

Level of Significance: α = 0.05.

Now to apply χ^2 - Test let us consider χ^2 - values from above Expected and Observed Matrices.

$$\chi^2 = \sum_{i=1}^{i=n} \frac{(o_i - e_i)^2}{e_i}; \text{ n} = 3.$$

		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
C1	Student-01	0.0185	0.0217	0.0000	0.04
	Student-02	0.0154	0.0000	0.0000	0.02
	Student-03	0.0137	0.0000	0.0156	0.03
	Total	**0.05**	**0.02**	**0.02**	**0.08**

According to the formula stated above, the value of χ^2 found from the above total is,

(Calculated) $\chi^2 = \mathbf{0.08}$.

Table Value of χ^2 at $\alpha = 0.05$ at (3-1) * (3-1) =4 degree of freedom is equal to **9.488**

Conclusion: The calculated value of χ^2 falls in acceptance region and hence we accept Null Hypothesis H_0

Claiming that, there is no difference between the frequencies of both the groups under consideration. The said observed difference can be strongly attributed to some unknown factor that is responsible for this cause.

χ^2- Test for Class -3

Null Hypothesis H_0 : That there is no difference between the frequencies of the two classes.

Alternative Hypothesis H_1 : Discrepancies claim no goodness of fit.

Level of Significance: $\alpha = 0.05$.

Now to apply χ^2- Test let us consider χ^2- values from above Expected and Observed Matrices.

$$\chi^2 = \sum_{i=1}^{i=n} \frac{(o_i - e_i)^2}{e_i}; \text{ n} = 3.$$

		Date			Total
		13 Oct 2016	14 Oct 2016	15 Oct 2016	
C1	Student-01	0.0115	0.0127	0.0141	0.04
	Student-02	0.0114	0.0118	0.0000	0.02
	Student-03	0.0102	0.0000	0.0000	0.01
Total		**0.03**	**0.02**	**0.01**	**0.07**

According to the formula stated above, the value of χ^2 found from the above total is,

(Calculated) $\chi^2 = \mathbf{0.07}$.

Table Value of χ^2 at $\alpha = 0.05$ at (3-1) * (3-1) =4 degree of freedom is equal to **9.488**

Conclusion: The calculated value of χ^2 falls in acceptance region and hence we accept Null Hypothesis H_0

Claiming that, there is no difference between the frequencies of both the groups under consideration. The said observed difference can be strongly attributed to some unknown factor that is responsible for this cause.

Conclusion: The calculated value of χ^2 falls in acceptance region and hence we accept Null Hypothesis H_0

Claiming that, there is no difference between the frequencies of both the groups under consideration. The said observed difference can be strongly attributed to some unknown factor that is responsible for this cause.

Vision

In order to satisfy inquisitiveness of meeting the notion of the best fit we have started our efforts to name and identify the principles of component analysis and have obtained better results in the same area. In addition to these factors we have found that there appears a good role of the concept of Eigen values and Eigen vectors in deriving and rectifying some expected records.

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