Scoping Study on OPERATION NeurOptimal OF Zengar

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Introduction

This study is proposed in order to discern whether treatment with neurofeedback (NFB) as understood with Zengar NeurOptimal technology, it is effective or if the data produced by the software of the device are random and respond to some kind of simulation algorithm.

hypothesis

1) NeurOptimal of Zengar is an effective training system NFB and therefore its application in inert matter not yield data improvement.
2) NeurOptimal of Zengar can collect electrical activity of the environment in which it is applied in baselines taken from pre- and post-training NFB way, but in no case a significant difference between two measures will be observed when the electrodes are applied to inert matter.
3) NeurOptimal of Zengar is a reliable data collection team of brain activity and should therefore contribute significantly different data when applied at different times of evolutionary cycle:
    i. a better measures are expected in young individuals in elderly.
    ii. Similar results are expected each other when applied to living matter, but are associated with said inert matter ranges of different ages.

Materials and Methods

Participants

Inert matter was selected from three stuffed animals from a group of six considering the similarity of material that are made. These three plush toys have been assigned a number and letter identification and have formed three age groups -A, B and C-. Group A is made upteenagers, young adults Group B and Group C forelderly.

The data relating to the age of the participants are shown in Table 1.

Table 1.

Group	Subjects	Age	Averageof age Groups
A (teenagers)	1A	10	13.33333
	2A	14	
	3A	16	
B (young adults)	1B	44	42
	2B	40	
	3B	42	
C (elderly)	1C	74	78.6666667
	2C	80	
	3C	82	
Average age Total			44.6666667

procedure

It was created the user for each participant NeurOptimal software, entering data identification and age.

They are applied to each individual sessions with NeurOptimal NFB as proposed by the manufacturer: a baseline is collected, training and applied NFB NeurOptimal baseline Post training data is then collected.

To place the electrodes participants suitable conductive paste, in particular paste Ten20 amounts are used. To ensure the placement of the electrodes in the same location in all sessions they have been marked with the conductive paste points where they will always be located.

In order to reduce sources of bias three sessions NFB NeurOptimal each subject, corresponding apply to each of the three age groups (A, B and C), thus no need to remove the electrodes from the three sessions the same subject, reducing biases that may come given by the different electrode placement.

After each session the electrodes are cleaned with water and soap solution.

Data collection

It was being collected from each session the index of divergence of each subjectboth the Preline and postline, are not entering training data since what indicates the evolution of the subject are the aforementioned data .

The extent of divergence that casts software Zengar NeurOptimal is greater the more upset tishe electrical functioning of the brain, and the more this value is close to 0, the better such operation.

Data is being entered in an Excel (Microsoft) provisionally to later be analyzed using SPSS.

Results

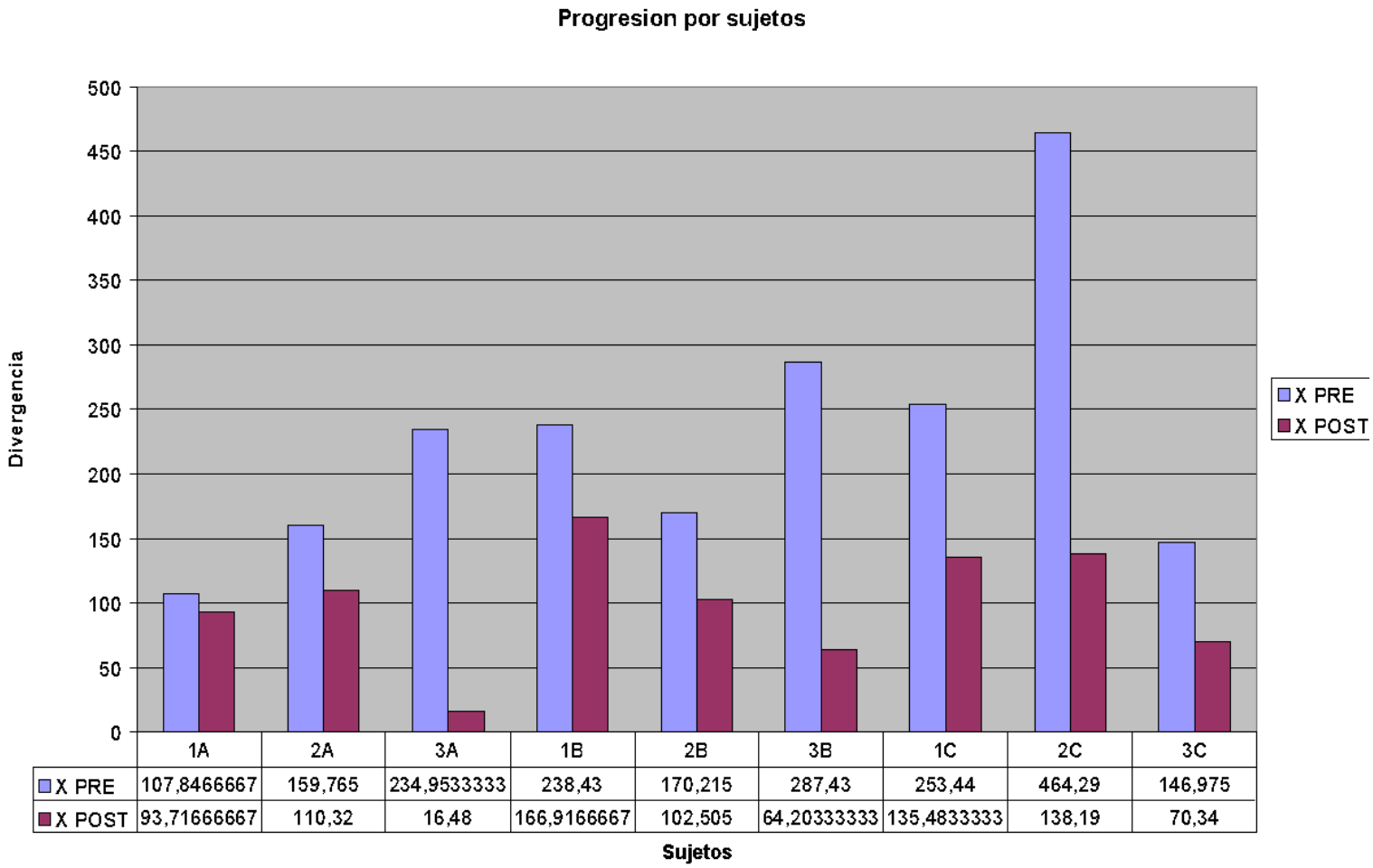
So far only been applied descriptive techniques in the processing of data, but show some interesting results.

They have been found arithmetic means of the pre and post of each subject and each group scores and their standard deviations (Table 2 and Table 3). They are also calculated Pearson correlation coefficients between sets of data (Table 1).

Mean scores before and after treatment in each subject (Table 2) show a divergence tendency to reduce these scores for all subjects. Furthermore, this trend is observed in all three groups (Table 3).

It has also calculated the total average of each session for Pre and Post workout, and again the same trend (Table 2) is observed.

Table 2.



	1A	2A	3A	1B	2B	3B	1C	2C	3C
X PRE	107,8466667	159,765	234,9533333	238,43	170,215	287,43	253,44	464,29	146,975
X POST	93,71666667	110,32	16,48	166,9166667	102,505	64,20333333	135,4833333	138,19	70,34

To check whether there is any relationship between age and the initial baseline is calculated correlation coefficient for both data sets (Table), showing that there is a direct relationship between the divergence score and age (ρxy = 0.61428662). Also it calculated the correlation between age and initial post online, with an index of ρxy = 0.13779452, indicating that there is little relationship between age and the results after the first session.

Was obtained correlation between the average age of each group and the pre and post group means baselines with ρxy = 0.99393156 at baseline and pre ρxy = 0.86867436 post in the base line, indicating the average scores of divergence do have a direct relationship with the average age of the participants.

It has been found similarly the correlation coefficient between the number of sessions NFB NeurOptimal received by each individual baseline and end Post obtaining a ρxy = -0.46656332, indicating an inverse relationship between the number of sessions and score Index divergence. It was also calculated the correlation between the average number of sessions per group and mean baseline of each group after training which has been obtained ρxy = -0.9971209, again showing a strong inverse relationship between the average number of sessions and the final group average baseline.

Table 3.

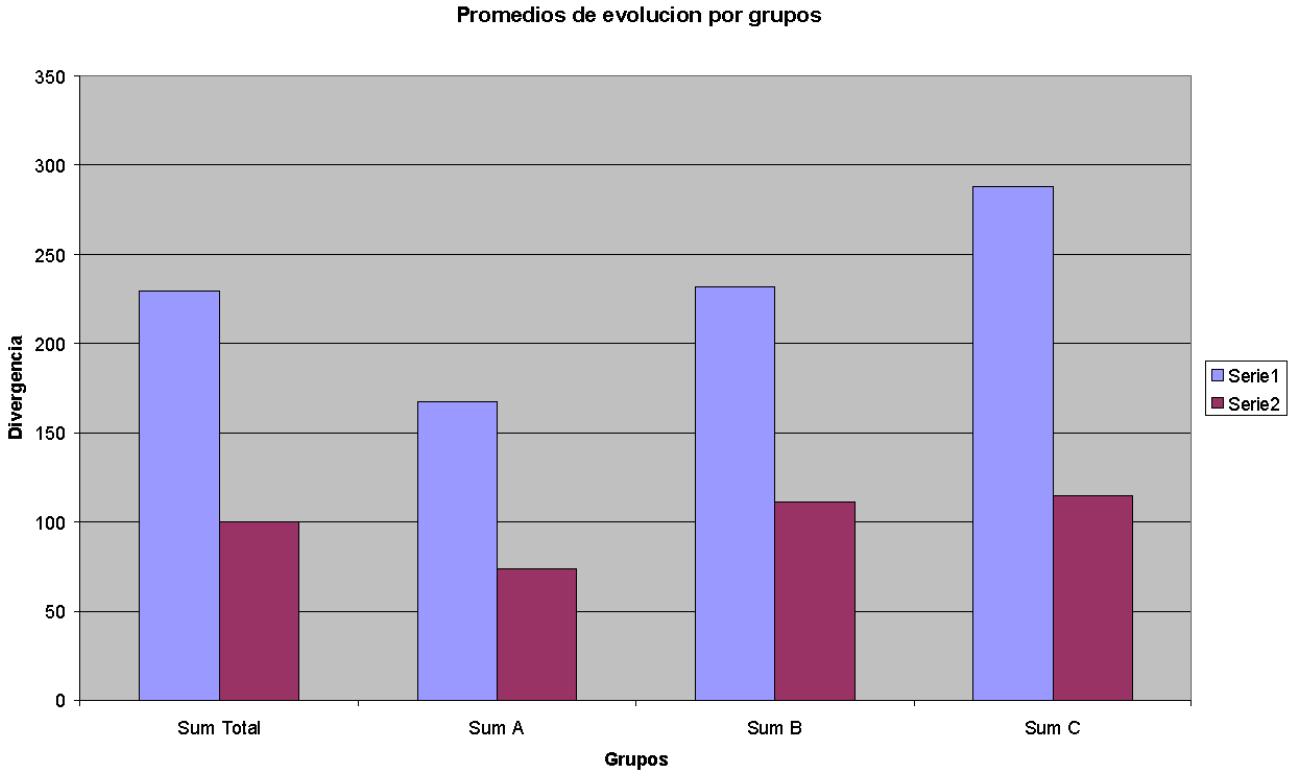


Table 1.

Session	XPre	XPost
	1	
	249.793333	
	70.22 2	
	246.362222	
	112.648889	
	3 156.678	
X	217.611185	102.77563

Table 2.

	Mean difference Pre-Post
A	94.0161114
B	120.816667
C	173.563889

Table 3.

	Coef. Corr.
Age-Line B. InitialPre-Post	0.61428662
Age Line B. Initial	0.13779452
No. Sessions B. Post-Line Final	-0.46656332
X Num.Sesiones Group-line B.Post Final	-0.9971209
Age X-XPre-Post	0.99393156
Age X X	0.86867436

Discussion

The configuration of a matrix of 9 participants from 3 stuffed animals allows greater control over some bias that might be introduced between 9 different dolls. To guarantee the placement of the electrodes in the same location we have left "Teddy Bear" marks produced by the conductive gel itself to guide us. And for comparisons between age groups that have created more reliable we have recorded data sequentially for each participant number in the three different age conditions (A, B and C), so that the measurement is taken 1A participant without removing the electrodes taken 1B and then finally, also without removing the electrodes, 1C.

It is interesting to note that age correlates positively with the baseline Pre initial, that would be to give us the state in which is the patient's brain. Significantly because that the younger get lower initial score of divergence, and therefore a better overall electrical activity of the brain, as we increase the age of the participants also increases the divergence, starting as a brain activity electrical more altered. Age and it can be considered a very influential factor in the result of measurement of brain electrical activity as measured the NFB NeurOptimal.

Age did not correlate significantly with the results obtained in the initial baseline Post when data of participants in isolation are taken, however, to take this data averaged manner with all participants we found that age is a factor also highly correlating with the results obtained from the first workout. Perhaps these data may seem slightly contradictory are due to small sample size we are handling.

The mean difference of pre and post measurements in each group (Table 3) showed that the biggest difference is in the group of adolescents and the smallest difference between two scores obtained in the elderly group, suggesting that They are teenagers who improve more and elders who improved to a lesser extent their brain electrical activity.

We found a negative correlation between the number of sessions received by each subject and the results obtained after the measurement Post last session. This correlation becomes significant when performed on three groups averaged manner. This indicates that a greater number of larger sessions is to improve participants separately, the groups and the total sample.

In short, on one hand, when participants are teenagers start from a better initial brain electrical state and also get some better results. Thus, age would be a very influential for both the starting point for treatment as the results obtained by the same factor. On the other hand, the more sessions receive the greatest subject are also achievements.

It should be borne in mind that improving these subjects closely related to their evolutionary time and the number of applied sessions, tends to show a malfunction of the NeurOptimal team Zengar since the subjects participating in this study lack of brain electrical activity, and even if they have some sort of electrical activity, it should be

constant (at least in the short periods where they have collected data for each session) and should not be significant differences between the previous measures and subsequent training of the same measures.

Conclusions

The data shows that we have collected so far is very small, so here show only a brief and superficial descriptive data analysis.

In order to make inferences with some statistical power should collect even more data.

Although this may suggest that the operation of the equipment is abnormal and should be questioned its effectiveness until more information becomes available.