174 - CEREBRAL POTENTIATION: EFFECTS IN VARIABLES BIOPERACTIONALITYS; MEMORY OF WORK, ATTENTION FOCUS AND REACTION TIME IN CHILDREN DIAGNOSED WITH HYPERACTIVITY (ADHD).

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INTRODUCTION:

The disturber of attention deficit and hyperactivity disorder (ADHD) is a disorder of neurobiological basis, with a high prevalence in children and adolescents, has as its main features, the difficulty to maintain focus on activities very long, repetitive or that they are not interesting. On individuals involved in disorder are easily distracted by stimuli of the external environment and internal thoughts, present difficulties in maintaining the focus of attention (ROHDE and HALPERN, 2004; VASCONCELOS et al, 2003 and SOUZA et al 2001). Also in accordance with Barkley, Murphy and Bauermeister apud Antony and Ribeiro (2004) the child with ADHD is distinguish to be in constant motion body during the execution of an activity, and by acting impulsively (I feel therefore act). This is basically because the child with ADHD respond to multiple environmental stimuli with an immediate readiness, unable to consciously choose the task or object priority of its action (ROHDE and HALPERN, 2004).

Thus, it is consistent to say that the way the brain works is a major part of the problem of who has ADHD, however, it is known that the brain can be modified through the neuroplasticity (HASSE & LACERDA, 2004). Starting from this concept of neuroplasticity (structural and behavioral changes) and the great importance of sensory integration in learning and performance (AYRES, 1972; CARVALHO, 1996 e KANDEL et al, 2002), one can say that these issues are fundamental to good learning. Luria (1976) and Vygotsky (1987) corroborate with this rational and stress that the process of knowledge construction, is an open system that can involves the integration of sensations, perceptions and mental representations. Disturbances in reception and organization of sensory information received on the world, affect the performance in other areas, including interpersonal relationships in the individual. One of the main variables affected by this disorder is the memory that, according to Da Silva and associates (2006), defined itself as an organic construct, responsible for storage "in neuron," of our perceptions of a form in general, in which our experiences are archived and retrieved when accessing them. Lombroso (2004) points out that the formation of all the memories requires morphological changes in the synapses, and these changes reflect the underlying cellular basis of persistent memories and ability to learn something new, then store the information in memory in the long term is part of the normal brain development. The cognitive tasks that require the subject to retain and process information in terms of working memory, the speed and / or the efficiency with which information is processed in this type of memory is vital to the final result of the implementation of the task because, otherwise, there will be lack of memory space to the cyclical processing of information (Da SILVA, 2006). This statement accredit a correlation between the time of reaction and intelligence, because both tend to be much more required in the transition from simple to complex tasks (Zaciorsky apud Carvalho, 1998) thus, higher levels of intelligence can make the subject more skilful in the use of effective strategies to deal concurrently with larger amounts of information and its processing (Fink & Neubauer, 2005, Miller & Vernon, 1992; Necka, 1992). Reaction time is a key indicator for the limitation neuromotor to process a stimulus of the outside environment and are defined as the time lapse between the beginning of the presentation of an external stimulus and the beginning of a motor response (CARVALHO, 1998 and Magill, 2000). According to Ladewig (2000), for withholding the information and then acess it and possibly stores it in memory of long duration, the process of care, which for the purpose of this study will be treated as synonymous of concentration, is fundamental and can be defined as the ability to keep the focus on relevant environmental signals.

When the information presented is linked to the characteristics of individuals affected by the disorder in question, we can say that a child affected by ADHD can have serious learning disabilities because of the difficulty in concentrating on stimuli, making it difficult to perceive the passage of information to memory longterm.

The audiovisual stimulation allows a great conditioning of cortical activity, improving the cognitive performance and driving the individual from the facilitation in the selection and interpretation of various stimuli and consequently put in the most appropriate response to each stimulus (HUTCHISON, 1986 e CALOMENI and associates, 2008). Based on this fact, this case study aimed to determine the effect of five sessions of audiovisual stimulation in the variables: working memory, focused attention and reaction time of a child with a clinical diagnosis of disorder and attention deficit and hyperactivity disorder (ADHD).

SAMPLE:

A sample of this case study, consists of an individual female (N = 1) with 06-year-old student of a private school in the city of Campos dos Goitacazes, with a clinical diagnosis of hyperactivity (Annex), but with a peculiarity, without deficit of learning and monitoring with specialist both in school when outside. Practitioner of physical activity and therapy regularly, and socially integrated with their environment.

METHODOLOGY:

The data were obtained in system test and retest respectively, before and after the five sessions of audiovisual stimulation. The individual's research made the task control in the school environment itself isolated in a room of other students, free of noise and properly prepared for this collection. During this task done test the individual assessed of working memory, attention focused test of reaction time and motor that served as a basis to determine the status of that initial three variables such bio perational.

In the test of working memory the subject had to memorize a sequence of 12 letters in a period of 10 seconds and in a maximum of 20 seconds try to put the cards in the same sequence showed initially, being adopted as the scoring of the test total number of letters, which managed to put evaluated in the correct order within the prescribed period. The cards used were part of an educational game of memory and represented figures of animals known byevaluated.

To test the concentrated attention was used the test of the grid, that consists of a grid with numbers at random from 00 to 99, where the subject had 2 minutes to mark up from 00, the numbers in sequence, and as a result was considered the last number reported in the correct order, evaluated by (Adriano, 2003). The measurement of reaction time to motor made through a software (Software MAT LAB 5.3-The math works, Inc), specifically for this purpose, prior to the test task that the individual was allowed to make a series of 03 test attempts to familiarization with the software and the procedure of the test and then evaluated held a series of 5 adopted which attempts to be the best scoring of the test result. Upon completion of the task control, daily, for five consecutive days, there was an intervention with the unit of audiovisual stimulation during a time of 15 minutes, making a total of 5 sessions, which were stimulated in the brain waves patterns 10, 9 and 8 Hz, respectively, during a time of 5 minutes each. All these frequencies are within the range called alpha, which runs from 08 to 13 Hz and aims to optimize the status of attention and learning. For this function was used a computerized electronic device called Sirius, manufactured by Mindplace, composed of dark glasses with 4 leds on the inner surface of each lens, a stereo headset and a microprocessor where it is possible to determine specifically the range of brain wave that is or train. At the end of the 5 sessions planned was held on experimental task, which followed the same criteria and procedures of the task control.

RESULTS:

TABLE 1 shows the results obtained in the test of working memory tasks performed in the control and experimental, where she obtained in this test, the task control, a score of 0 hits job to repeat the same sequence of letters that was presented to memorize, already in the experimental task after the five sessions of cortical stimulation obtained a score of 3 hits in the same procedure which represents an improvement in performance of 25%, thus showing that the number of sessions provided a significant improvement in working memory .

Table1: Number of letters submitted for memorization and number of hits obtained in experimental and control tasks.

TABLE 1: TEST OF WORKING MEMORY		
EVENT	EVENT LETTERS HAD	SCORES OF HITS
TASK CONTROL	12	0
TRIAL TASK	12	3 *

*Improvements in the experimental task, 25%.

FIGURE 1 is showing the effect of intervention by audiovisual stimuli in working memory, showing the improvement between the experimental and control tasks, characterizing the positive effect caused by such intervention between the two different times.

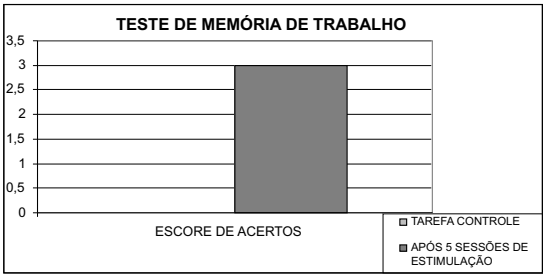


Figure 1: Graphic presentation of the results of the test of working memory showing the improvement of 25% between the events.

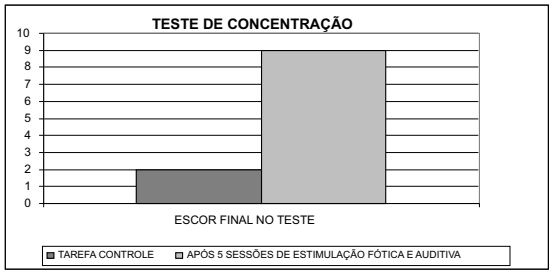
TABLE 2 describes the data obtained in tests of attention focused conducted after the control and experimental tasks, collected immediately after the test of working memory reported above. These data shows that in the task control, before the sessions of stimulation, the assessed obtained 02 scores in a test of concentration attention and after the series of audiovisual stimulations in the experimental task, it reached 09 scores , this represents a significant improvement of 350% in performance and leads us to believe in the great positive effect in this compendium bio-operational.

Table 2: Presentation of data to test the grid of numbers used to measure the level of attention focused. Scores in the experimental and control tasks where she obtained an improvement in the performance of the estimated 350%.

TEST OF ATTENTION CONCENTRAT ED	
EVENT	SCORES OF TEST
TASK CONTROL	2
TRIAL TASK	9*

The data displayed in table 2 are plotted in FIGURE 2, in form of a chart, where you can observe the vast improvement in performance obtained in the experimental task after the sessions of audiovisual stimulation.

Figure2: Representation of the results of the test of attention focused on job control and after stimulation audiovisual showing the great improvement of this variable.



Already in TABLE 3 are given the test results of the reaction time task applied in motor control, before the intervention of brain stimulation, and the experimental task, after this stimulation. These results show that in these moments there was no difference between any of the data, in both events, the score obtained was 0.55 thousandths of a second (ms) that what characterizes this person for the audiovisual simultaneous stimuli did not cause any influence in this variable searched.

Table 3: Presentation of scores of reaction time evaluated in the tasks of motor control and experimental showing no effect of the stimulation in this variable.

TESTING OF MOTOR RESPONSE	
EVENT	SCORES OF TEST
TASK CONTROL	0,55 ms
TRIAL TASK	0,55 ms

FIGURE 3 provides a graphic representation of data obtained in the test of time for reaction motor, is represented in this figure as the audiovisual stimulation did not exercise any influence on the reaction time of assessed differently from other variables studied.

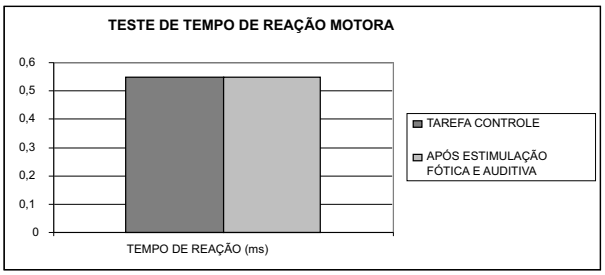


Figure 3: Presentation of scores of the reaction time obtained in control and experimental tasks, evaluated before and after receiving the training with mental and auditory stimuli fóticos simultaneous, which is not returned difference between the assessments.

After the presentation of the results obtained in this case study made in the previous session must now, at the next meeting, the discussions relevant to these results.

DISCUSSION:

The ADHD is a disorder known that can compromise the ability to learn. This is because, who suffers from this disorder can not remain focused on the act of learning. For this reason present evidence that may help the hyperactive individuals to remain focused on tasks relevant in terms of learning may represent a leap in the quality of learning of individuals affected by this comorbidity.

In this context, the audiovisual stimulation is presented as an alternative to aid learning. Already used by several authors, especially in studies of the variables bioperacionais, working memory, attention and reaction time to concentrate (CARDOSO, and MACHADO DA SILVA, 2006; CALOMENI and associates, 2007; DA SILVA and associates, 2008 e CALOMENI and associates , 2008), this stimulation acts directly on the thalamus, imposing a pre-determined frequency rhythmic (BRADY, 1997; BEAR, AND PARADISO Connors, 2002). The imposition of the frequency rhythmic turns on a mechanism of time detection in neuronal discharges called Law of HEBB (HASSE and LACERDA, 2004), that determines the cortex to improve a specific performance in accordance with the frequency stimulated. The frequencies imposed in this study, according to Da Silva, Marques and Ribeiro (2006) are related to learning and memory then, it was concluded that, when you stimulate this type of frequency is creating a scenario cortical conducive to this type of event.

In the test time of motor reaction was not observed any kind of change in the result obtained during the experimental and control tasks. This contrasts with other findings of this study. This fact can be explained if taking into account the diagnosis of Hyperactivity of the research subject, and the specific procedure to test the reaction motor that consisted of an wait evaluated visual signal appear at random on the right or left, on the computer screen for react and that it played a key specific. It was observed that during the time of inactivity in which assessed got to remain focused on the computer screen (awaiting stimulus), it was difficult to focus, clearly showing the impatience in hopes of stimulating the necessary reaction of adequately. This is an obvious characteristic of who is affected by ADHD.

Assuming that is the question of why ADHD, diagnosed in children, not negatively influence in retestes, you can attribute this fact to the procedures of other tests as the testing of memory and attention are focused more dynamic and not allow the assessed, moments of inactivity, which prevents the loss of focus on the task to be performed.

CONCLUSION:

It was concluded that the brain stimulation, by audiovisual stimuli applied for a total of 5 sessions of 15 minutes, with frequencies from 08 to 10 Hz, caused a positive effect on variables bioperacionais, working memory and attention concentrated the subject of this research. This result opens a perspective for the great potential of this type of intervention as an adjunct in aid in learning, persons affected by the disorder ADHD, at least in concentration and memory (bioperacionais variables).

The results in the reaction time motor achieved in this study were due to the very nature of the disorder and the procedure of the test, inconclusive. However, the excellent results obtained in the test of working memory and attention focused reinforce the idea of using audiovisual stimulation as an aid, including in existing therapies for this group of people.

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ABSTRACT:
This case study aimed to verify the results of cortical stimulation in the short-term memory, concentration and motor reaction time of a child with diagnosis of ADHD (disturber and attention deficit and hyperactivity disorder). These variables were measured before and after five rounds of 15 minutes of audiovisual stimulation with frequencies from 08 to 13hz. The results showed an improvement of 350% in the test of concentration, 25% in the test of short-term memory and no significance to test the reaction time. It follows that the audiovisual stimulation may be an adjuvant in aid to people suffering from ADHD, especially in tasks involving the compendiums bioperactionalitys of short-term memory and focused attention .
Key words: Hyperactivity, Learning, Audio Visual Stimulation

RÉSUMÉ:
Cette étude de cas visant à vérifier les résultats de la stimulation corticale dans la mémoire à court terme, la concentration dans le temps de réaction et de moteur d'un enfant avec le diagnostic de TDAH (trouble déficitaire de l'attention et l'hyperactivité et les troubles). Ces variables ont été mesurées avant et après cinq tours de 15 minutes stimulation audiovisuelle avec des fréquences de 08 à 13hz. Les résultats ont montré une amélioration de 350% dans le test de concentration, 25% dans le test de la mémoire à court terme et pas de signification à tester le temps de réaction. Il s'ensuit que la stimulation de l'audiovisuel mai être un adjuvant de l'aide aux personnes souffrant de TDAH, en particulier dans les tâches de la biopercionais recueils de la mémoire à court terme et attention.
Mots clés: hyperactivité, d'apprentissage, de stimulation visuelle audio

RESUMEN:
Este estudio de caso destinado a verificar los resultados de la estimulación cortical en la memoria a corto plazo, la concentración en el tiempo de reacción motor de un niño con diagnóstico de TDAH (trastorno por déficit de atención e hiperactividad y trastorno). Estas variables se midieron antes y después de cinco rondas de 15 minutos audiovisual estimulación con frecuencias de 08 a 13hz. Los resultados mostraron una mejora del 350% en la prueba de concentración, el 25% en la prueba de memoria a corto plazo y carece de importancia para poner a prueba el tiempo de reacción. De ello se deduce que la estimulación audiovisual puede ser un adyuvante en la ayuda a las personas que sufren de ADHD, especialmente en tareas que impliquen en compendios bioperacionales de memoria a corto plazo y en la atención centrada.
Palabras clave: hiperactividad, de aprendizaje, Estimulación Audio Visual

RESUMO:
Este estudo de caso teve como objetivo verificar os resultados da estimulação cortical na memória de curto prazo, na concentração e no tempo de reação motora de uma criança com diagnose de TDAH (transtorno e déficit de atenção e hiperatividade). Estas variáveis foram mensuradas antes e após cinco sessões de 15 minutos de estimulação audiovisual com freqüências de 08 a 13hz. Os resultados encontrados apontaram uma melhora de 350% no teste de concentração, 25% no teste de memória de curto prazo e nenhuma significância para o teste de tempo de reação. Conclui-se que a estimulação audiovisual pode ser um coadjuvante no auxílio á pessoas portadoras do TDAH, principalmente nas tarefas que envolvem os compêndios biopercionais memória de curto prazo e atenção concentrada.
Palavras chaves: Hiperatividade, Aprendizagem, Estimulação Audiovisual