



## The use of tasks involving the four basic operations and mathematical problems in combating the progress of Alzheimer's disease

Juari Micca Mostazo Guelta\*, Carlos Miguel da Silva Ribeiro

### Abstract

Alzheimer's disease is a degenerative disease, damaging people, the majority of whom are elderly, with regard to loss of memory, cognitive functions and motor skills. Considering mental stimulation as an alternative to delayed progression of the disease, the study aims to develop tasks that allow to work on problems involving arithmetic with individuals with Alzheimer's disease and to discuss how these stimuli may contribute to the disease. For the accomplishment of the work, a set of tasks designed to work the memory and the cognitive and motor functions of people affected by Alzheimer's disease was developed.

### Key words:

*Alzheimer's disease, Mathematics, Brain, Mathematics*

### Introduction

Present an overview on the theme and purpose of the work. Aiming at the application of mathematical tasks, the project seeks to present a descriptive analysis of Alzheimer's disease, its performance in the brain with regard to its power to impair neuronal activities and, consequently, cognitive functions.

The paper also attempts to give a description of the action of solving mathematical problems in memory; especially regarding the performance of the disease. The tasks aim beyond the mental stimulus itself to provide information that contributes to a broader understanding of the role, potentialities and limitations of activities related to the calculation of magnitudes, resolution of the four operations and problems for disease retardation, and to analyze which way this occurs.

### Results and Discussion

The work focused on the study of arithmetic operations, considering the basic calculation a form of brain development and possible source of delay of cognitive diseases such as Alzheimer's. This project seeks information that better understand the potentialities and limitations of tasks designed to mentally stimulate people with this disease. With this in mind, the need to equate the nature and type of the tasks in order to pursue a certain objective is associated (RIBEIRO, 2016).

It is considered that, when solving mathematical problems, the left angular gyrus is activated, which helps to recover the long-term memory for numerical facts, acting together with the hippocampus (affected by Alzheimer's disease), recovering facts, such as for example the tables to solve problems. Thus, by hypothesis, task resolution with a focus on numerical problems that optimize mental calculation strategies, seem to have potential for the reduction of Alzheimer's disease.

A study of the theoretical and methodological dimensions associated to the project of Scientific Initiation and elaborated tasks was carried out based on: Discussion of the Interpretative Knowledge (RIBEIRO, MELLONE, JAKOBSEN, 2013; RIBEIRO, MELLONE, 2014) of Vergnaud (Vergnaud, 1996) and the elaboration of 4 sets of tasks, each of these sets associated with specific objectives.

The Conceptual Fields of Vergnaud, used as reference in the study, are divided into Additive and Multiplicative. The first is the addition and subtraction operations. For the elaboration of the tasks, the meanings of the mentioned operations were studied, being these: transformation, composition, withdrawal, comparison and completeness. For the second Field, which contains the operations Multiplication and Division, the meanings are: addition of repeated plots, comparison, multiple combinations, simple proportion, rectangular configuration, partition and quota for the multiplicative conceptual field.

### Conclusions

The exercises and problems elaborated in the content of the tasks had as objective to ascertain if and what the senses that an individual afflicted by Alzheimer's could give to the Arithmetic Operations, besides evaluating its potentialities as a vehicle of stimulus to the retardation of the progress of this disease. Based on these ideas, for the development of the research tasks were elaborated with the purpose of being applied in people affected by Alzheimer's disease. The material developed was based on Vergnaud's Conceptual Fields (VERGNAUD, 1996) and on the content concerning Interpretative Knowledge (RIBEIRO; MELLONE; JAKOBSEN, 2013; JAKOBSEN; RIBEIRO; MELLONE, 2014).

### Acknowledgement

To God, my parents, my girlfriend, for the support, and to Professor Carlos Miguel for the transmitted knowledge.

Development Institution: Centro Nacional de Desenvolvimento Científico e Tecnológico

RIBEIRO, C. M.; MELLONE, M.; JAKOBSEN, A. Prospective teachers' knowledge in/for giving sense to students' productions. In: *Proc. 37th Conf. of the Int. Group for the Psychology of Mathematics Education*. 2013. p. 89-96.

VERGNAUD, Gérard. The theory of conceptual fields. *Theories of mathematical learning*, p. 219-239, 1996.