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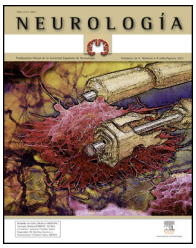

ORIGINAL ARTICLE

Benefits of deep encoding in Alzheimer's disease. Analysis of performance in a memory task using the Item Specific Deficit Approach☆

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KEYWORDS
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Abstract
Introduction: The aim of this study was to test the encoding deficit hypothesis in Alzheimer disease (AD) using a recent method for correcting memory tests. To this end, a Spanish-language adaptation of the Free and Cued Selective Reminding Test was interpreted using the Item Specific Deficit Approach (ISDA), which provides three indices: Encoding Deficit Index, Consolidation Deficit Index, and Retrieval Deficit Index.
Methods: We compared the performances of 15 patients with AD and 20 healthy control subjects and analysed results using either the task instructions or the ISDA.
Results: Patients with AD displayed deficient encoding of more than half the information, but items that were encoded properly could be retrieved later with the help of the same semantic clues provided individually during encoding. Virtually all the information retained over the long term was retrieved by using semantic clues. Encoding was shown to be the most impaired process, followed by retrieval and consolidation. Discriminant function analyses showed that ISDA indices are more sensitive and specific for detecting memory impairments in AD than are raw scores.
Conclusions: These results indicate that patients with AD present impaired information encoding, but they benefit from semantic hints that help them recover previously learned information. This should be taken into account for intervention techniques focusing on memory impairments in AD.

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PALABRAS CLAVE
Memoria;
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Evocación;
Procesamiento

Beneficios de la codificación profunda en la enfermedad de Alzheimer. Análisis del rendimiento en una tarea de memoria mediante el *Item Specific Deficit Approach*

Resumen
Introducción: El presente trabajo tiene como objetivo comprobar la hipótesis del déficit de codificación en la enfermedad de Alzheimer (EA) mediante el uso de una reciente metodología de corrección de test de memoria. Para ello, una adaptación española del *Free and Cued Selective Reminder Test* fue interpretada mediante el *Item Specific Deficit Approach* (ISDA), el cual proporciona 3 índices: Índice de déficit de codificación, Índice de déficit de consolidación e Índice de déficit de recuperación.
Métodos: Se comparó el rendimiento de 15 pacientes con EA y 20 sujetos sanos, y los resultados se analizaron mediante las instrucciones originales de la prueba y mediante el enfoque ISDA.
Resultados: Los participantes con EA codificaron de manera deficitaria más de la mitad de la información, pero aquella bien codificada fue recordada posteriormente utilizando las claves semánticas proporcionadas individualmente durante la codificación. Prácticamente la totalidad de la información recordada a largo plazo fue la recuperada con claves semánticas. La codificación fue el proceso más alterado, seguido de la recuperación de la información y del almacenamiento. Los análisis discriminantes mostraron que los índices ISDA son más sensibles y específicos que las puntuaciones brutas para la detección de alteraciones mnésicas en la EA.
Conclusiones: Los resultados indican que las personas con EA presentan alteraciones en la codificación de la información, pero se benefician de ayudas semánticas para la recuperación a largo plazo de la información previamente aprendida, lo que debería ser utilizado en las intervenciones centradas en las alteraciones de memoria en la EA.

Introduction

Memory changes constitute one of the most frequent and incapacitating consequences of brain damage.[1] They may present as the first and most important symptom of a degenerative disease such as Alzheimer disease (AD).[2,3] Patients with AD present changes in delayed memory that result in significantly poorer performances than those of healthy subjects on both episodic and semantic memory tests.[4] Patients with AD may even perform at floor level during the early years of the disease.[5] For this reason, they require meticulous assessment of all processes involved in learning and memory in order to identify which of these processes has changed, thus permitting clinicians to plan the most appropriate intervention. Neuropsychological tests are mainly interpreted based on differences between performance in the last learning series and performance in a long-term memory trial after a 20- to 30-minute interval during which subjects will rapidly forget previously learned information. On this basis, AD came to be known as a disease characterised by lack of long-term recall of verbal information with no changes in short-term memory, at least in early stages, as shown by the backward digit span task used in the Wechsler scales.[5] Another finding that confirms this concept is the fact that patients with AD do not seem to benefit from semantic cues in the recognition phase in such tests as the Rey Auditory Verbal Learning Test or the California Verbal Learning Test (CVLT). These data suggest a pattern of changes in data storage that differs from the patterns displayed by other diseases such as vascular dementia,[6] Parkinson's disease, or dementia with Lewy bodies. In the entities named above, patient performance improves with the aid of semantic cues.[7,8]

The Item Specific Deficit Approach (ISDA)

Wright et al.[9] recently developed a scoring system that differs from the one habitually used to specifically identify the memory process that has suffered changes. The study used the CVLT and examined memory in patients with HIV or traumatic brain injury.[9–11] This procedure, named the ISDA provides 3 indices: (a) the Encoding Deficit Index (CodDI); (b) the Consolidation Deficit Index (ConsDI), and (c) the Retrieval Deficit Index (RetDI). The higher the CodDI, the more severe the encoding alteration. Both the ConsDI and RetDI are scored from 0 to 1, and higher scores indicate more severe impairment. Clinicians may use the ISDA to interpret patient performance more specifically since it resolves the problems derived from interpreting a global test score; the ISDA calculates performance by analysing each item individually.

Alzheimer disease: a consolidation problem or a retrieval problem?

AD is regarded as an illness in which memory problems stem from changes in memory storage, given that delayed recall in patients with AD is especially poor for verbal memory tasks[12] and performance does not improve during the recognition phase.[13,14] Nevertheless, tests using free recall as a measure of storage, and recognition as a