

Assessing Memory Deficits Using Latent Class (Hierarchical) Multinomial Processing Tree Modeling: An Illustration Using Data from Clinical Groups in Taiwan

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The main symptom of dementia is the degradation of memory. In clinical settings the common approach to assess the functioning of memory is to take memory tests based on recall and recognition. However, such tests hardly reveal the underlying causes of memory degradation, because scores of these tests typically are not results of a single cognitive process but are influenced by several cognitive processes such as storage and retrieval. In this paper we introduce a cognitive modeling approach called “multinomial processing tree models” to the clinical psychology community in Taiwan. This model assumes that the memory process consists of unstored, intermediate, and long-term states. The transition among the three states follows a discrete-state Markovian learning process, with the respective probabilities of storage and retrieval being characterized by some parameters. We illustrate the use of the model to clinical data collected from National Taiwan University Hospital, including Alzheimer’s disease, early-onset dementia, senile dementia, mild cognitive impairment, vascular dementia, and organic brain syndrome. To assess the within-group heterogeneity commonly seen in clinical settings, we also incorporate a latent class analysis into the model. Parameter estimates via goodness-of-fit using the computer program HMMTree reveal that different types of dementia undergo somewhat differentiable deficits of storage and/or retrieval processes in the immediate and long-term states. We also discuss two limitations of the current study, namely the representativeness of the sample and the restriction of the HMMTree program.

Keywords: *Alzheimer’s disease, dementia, latent class analysis, Markovian learning process, multinomial processing tree model*