Clustering and expertise in a recall task: The effect of item organization criteria

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Abstract

The present study investigates the hypothesis that the traditional positive relationship between expertise and item organization during recall depends on the degree of domain-relevance of the criteria used to assess item organization. The hypothesis was tested on a beverage list recall task by comparing experienced waiters, beginner waiters and non-waiters. Two criteria were used to assess recall clustering: (1) according to common beverage categories and (2) according to functional categories involving expertise. Results revealed no differences between groups for common categories, whereas experienced waiters clustered and performed significantly more and better than the two other groups for functional categories. Educational implications are discussed in the conclusion.
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1. Introduction

In vocational training, there is a growing call for knowledge about expertise development in order to improve the acquisition of cognitive skills and of knowledge base. Knowing how experts deal with their professional tasks is necessary to design

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apprenticeship programs. This approach requires to select relevant tasks allowing to grasp expert's behavior. The research reported in the present article address this question in a high memory demanding professional task. The purpose is to show how the criteria commonly used to assess the organization of knowledge underlying memory performance may lead to divergent conclusions concerning the gap between expert and novice.

Research using the novice–expert paradigm has firmly established the role played by the knowledge base in memory performance when recall stimuli relate to domain expertise. Since the initial studies of De Groot (1946/1978) and Chase and Simon (1973) on memory of chess players, Vicente and Wang (1998) have identified 51 studies showing the effect of expertise on memory performance in various domains. This effect reflects the organization of the knowledge base since experts' superiority in recall only occurs in their task domain and for meaningful (as opposed to random) stimuli: experts recall more pieces of information clustered into larger meaningful patterns than novices. The pioneering research conducted by Chi (1978) and replicated by Schneider, Gruber, Gold, and Opwis (1993) extended this result to children.

Surprisingly, more recent studies conducted by Bjorklund, Schneider and their colleagues failed to confirm superior clustering in experts. These studies comparing children with different specific knowledge in domains such as soccer or baseball led to the following pattern of results. First, experts performed better than novices in list recall (e.g., Gaultney, Bjorklund, & Schneider, 1992; Schneider & Bjorklund, 1992; Schneider, Bjorklund, & Maier-Brückner, 1996) and in text recall (e.g., Schneider et al., 1996; Schneider, Körkel, & Weinert, 1989). Furthermore, when structural equation modeling procedures were used, domain-specific knowledge was the strongest predictor of list recall performance (Schneider, Schlagmüller, & Visé, 1998) and text recall performance (Körkel & Schneider, 1992; Schneider et al., 1998). Second, contrary to expectations and to findings described above on expertise, no significant difference was found between experts and novices in clustering during list recall. Finally, the correlation between clustering during recall and recall performance was only significant for experts (Schneider et al., 1998) and a relationship between these variables was found in causal modeling (Schneider et al., 1998).

In summary, the different results reported above appear consistent across domains and age (adults vs. children), except in the organization of stimuli during recall between experts and novices. One might think that this divergent result is due to the empirical definition of expert and novice used by Schneider and his colleagues. As Gaultney et al. (1992) pointed out themselves, expertise was used in a relative sense in their studies, since an expert was defined as someone who scores above average in a declarative test of domain knowledge. However, a similar pattern of results was obtained when they contrasted the farthest scores (the top quartile vs. the bottom quartile of scores). Therefore, this finding cannot be due to either a ceiling or a floor effect.

One reason that could account for these divergent results is the choice of items used in the recall tasks and the way they are grouped together into categories. As stressed out by Ericsson and Smith (1991), the criteria used to create a task and to select stimuli in order to capture expertise performance are crucial. For example, Gilhooly, Wood, Kinnear, and Green (1988) showed that expert map users