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Brief Report

The six blind men and the elephant: Are episodic memory tasks tests of different things or different tests of the same thing?

Lucy G. Cheke *, Nicola S. Clayton

Department of Psychology, University of Cambridge, Cambridge CB2 3EB, UK

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ABSTRACT

The development of episodic memory in children has been of interest to researchers for more than a century. Current behavioral tests that have been developed to assess episodic memory differ substantially in their surface features. Therefore, it is possible that these tests are assessing different memory processes. In this study, 106 children aged 3 to 6 years were tested on four putative tests of episodic memory. Covariation in performance was investigated in order to address two conflicting hypotheses: (a) that the high level of difference between the tests will result in little covariation in performance despite their being designed to assess the same ability and (b) that the conceptual similarity of these tasks will lead to high levels of covariation despite surface differences. The results indicated a gradual improvement with age on all tests. Performances on many of the tests were related, but not after controlling for age. A principal component analysis found that a single principal component was able to satisfactorily fit the observed data. This principal component produced a marginally stronger correlation with age than any test alone. As such, it might be concluded that different tests of episodic memory are too different to be used in parallel. Nevertheless, if used together, these tests may offer a robust assessment of episodic memory as a complex multifaceted process.

* Corresponding author.
E-mail address: lgc23@cam.ac.uk (L.G. Cheke).

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Introduction

> Six blind men wanted to discover for themselves the nature of an elephant. Each one went to the elephant and touched it. The first touched the elephant's leg and said "it is like a tree," the second touched the elephant's tail and said "it is like a rope," the third touched the elephant's trunk and said "it is like a snake," the fourth touched the elephant's tusk and said "it is like a spear," the fifth touched the elephant's side and said "it is like a wall," and the sixth touched the elephant's ear and said "it is like a fan."
>
> [Ancient Indian fable]

Characterizing healthy episodic memory development in young children is important because it allows problems with memory to be identified and informs appropriate educational strategies. Although the development of memory in children has been studied for nearly a century, to date there is considerable variation in the methodologies used to do so. The fable of the six blind men and the elephant serves to warn us that a single perspective on an intangible phenomenon may provide truth but can also be misleading. As psychologists, we can never directly assess psychological processes but can only measure performance on particular tests that are thought to rely on those processes. Different tests of episodic memory stem from different philosophical, theoretical, and empirical origins, and they differ substantially in the outward behavior they assess. Such eclecticism can be both a strength and a weakness. A range of testing methodologies can allow triangulation on a single common feature. This may allow production of a battery of measures that provides a more complete picture of a psychological process. However, a range of tests that vary largely in their methodologies may merely muddy any possible interpretation.

In this study, the same sample of 3- to 6-year-old children was tested on a range of episodic memory tests. These tests are all very different in their surface features, so it might be predicted that they would produce different results. Nevertheless, they all putatively assess the same underlying cognitive ability, and as such it might instead be predicted that there should be a demonstrable association among them, reflecting this latent variable. The tests we chose to investigate are some of those that have been claimed to tap episodic memory or are candidates for such a claim. Therefore, we should expect to see a similar developmental change in all of the tests (Wellman, Cross, & Watson, 2001). In the following section, we briefly review the literature concerning these tasks.

Free and cued recall

Free and cued recall paradigms involve learning a series of items (words or pictures) and then later being asked to recall them, either with (cued) or without (free) external cues such as category words to aid recollection. Freely recalled items are more likely to be reported as "remembered" rather than as "known" compared with cued items (Tulving, 1985) and, therefore, are considered to be more reliant on episodic memory. Both free recall and cued recall improve between 3 and 8 years of age, with children of all ages reliably finding cued recall to be the easier of the two (Naito, 2003; Perner & Ruffman, 1995; Sluzenski, Newcombe, & Ottinger, 2004).

What–Where–When

The What–Where–When test requires participants to remember the time and location of a particular event. Clayton and Dickinson (1998) argued that this requires an integrated spatiotemporal representation of the event, which corresponds to Tulving and colleagues' definition of episodic memory (Tulving, 1972). The What–Where–When test produces cross-sectional developmental patterns similar to those of other tests, with improvements between 2.5 and 5 years of age (Burns, Russell, & Russell, in press; Hayne & Imuta, 2011; Newcombe, Balcomb, Ferrara, Hansen, & Koski, 2014; Russell, Cheke, Clayton, & Meltzoff, 2011).