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Inhibitory control during selective retrieval may hinder subsequent analogical thinking

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Abstract

Analogical reasoning is a complex cognitive activity that involves access and retrieval of pre-existing knowledge in order to find a suitable solution. Prior work has shown that analogical transfer and reasoning can be influenced by unconscious activation of relevant information. Based on this idea, we report two experiments that examine whether reduced access to relevant information in memory may further disrupt analogical reasoning unwittingly. In both experiments, we use an adaptation of the retrieval practice paradigm [1] to modulate memory accessibility of potential solutions to a subsequent set of analogy problems of the type 'A is to B as C is to ?'. Experiment 1 showed a retrieval-induced impairment in analogical problem solving. Experiment 2 replicated this finding and demonstrated that it cannot be due to the deliberative episodic retrieval of the solutions to the analogies. These findings, predictable from an inhibitory framework of memory control, provide a new focus for theories of analogical transfer and highlight the importance of unconscious memory processes that may modulate problem solving.

Introduction

Memory plays a prominent role in our everyday reasoning activities by allowing us to access relevant past experiences, which could thus be applied to new situations [2]. In the context of problem solving, considerable attention has received the way in which we access, retrieve and use stored knowledge to solve new problems [3–7]. Much of this research has focused on inductive reasoning processes such as analogical thinking, which involves generating novel connections and transferring information from a well-known domain to a new one on the basis of similarities and correspondences [8]. Analogical reasoning is seen as a fundamental tool in a wide variety of problem-solving contexts such as scientific discovery [9], mathematics [10,11] or creative problem solving [12]. In all these contexts, memory plays a central role since information from one domain has to be accessed and applied to a different one. For instance, 'the solar system' analogy has been used to explain the atomic structure (how a planet orbits the sun can be thought as analogous to the way in which an electron orbits an atomic nucleus), but this analogy only can be inferred if the person already knows about and have access to the stored information regarding the structure of the solar system [13]. There is

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