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Authors

Harris, Ruby C
Weatherholt, Tara
Burns, Barbara
et al.

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Analysis of Attention Networks and Analogical Reasoning in Children of Poverty

Ruby C Harris (rcharr02@louisville.edu)

Tara Weatherholt (tnweat03@louisville.edu)

Barbara Burns (bburns@louisville.edu)

Department of Psychological and Brain Sciences, University of Louisville
Louisville, KY 40292 USA

Catherine Clement (catherine.clement@eku.edu)

Department of Psychology, Eastern Kentucky University
Richmond, KY 40475 USA

Introduction

Researchers describe the development of analogical reasoning as a shift from similarity judgments based on simple perceptual feature comparisons to more complex reasoning based on common relational structures (Gentner, 1989). Given that this shift entails a selective focus on relational information, perhaps attentional development affects the development of analogy.

Recently attentional processes have been examined in terms of three networks of attention; orienting, alerting, and executive (Posner & Petersen, 1990). The executive network, an attentional control network required for the resolution of cognitive conflict, may be particularly important for analogical reasoning tasks. Recent research has shown that the same neurological pathways are activated in selective attention activities of the executive network and analogical reasoning (Duque & Posner, 2001; Luo, Perry, Peng, Jin, Xu, Ding, & Xu, 2003).

Children from low-income backgrounds have been shown to have impaired attentional and cognitive abilities (Norman & Breznitz, 1992). In the current study, individual differences in children's skills on the three attention networks are studied in order to understand the relationship between specific attentional processes and analogical reasoning in the context of poverty.

Methods

Participants were 78 children (Mean age = 56.88 mos, SD = 5.97) from low-income backgrounds. Children were assessed on computerized attention tasks designed to tap the three attention networks (Berger, Jones, Rothbart, & Posner, 2000). Analogical reasoning was assessed using the Matrices Subtest of the Kaufman Brief-Intelligence Test (Kaufman & Kaufman, 1990).

Results

Hierarchical regression was performed to predict analogical reasoning ability using median reaction time on the attention tasks. Controlling for cognitive ability, the overall model was significant, $F(4, 72) = 4.091$, $p < .005$. Performance on the executive attention task added a significant amount of variance (6.4%) to the model.

Discussion

The present study is unique in its examination of the relation between attention and analogical reasoning in the context of a high-risk environment. Future studies should examine how these findings relate to Halford's (1989) proposals about the impact of processing capacity on the development of analogy. Further, studies should examine how executive attention interacts with changes in domain knowledge to affect analogy task performance. The present results suggest that high functioning executive attention may be a protective factor in a high-risk environment.

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