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Comparing the Developmental Correlates of Additive and Subtractive Counterfactual Reasoning in Chinese-Speaking Children

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Abstract : Counterfactual reasoning involves reasoning about what might have happened following changes to past events or states. This ability helps people learn lessons from past experiences to draw blueprints for the future. To understand the cognitive underpinnings of this important cognitive skill, it is helpful to investigate what cognitive abilities are associated with counterfactual reasoning. In Chinese, there are no subjunctive forms for directly marking counterfactual thoughts. Additive (introducing new elements to the past) and subtractive (removing existing elements from the past) premises contain different cues for inferring counterfactuality. Hence, interpreting and reasoning from additive and subtractive counterfactual premises might involve different cognitive processes. This study compared the developmental correlates of additive and subtractive counterfactual reasoning in Chinese-speaking children as an under-researched population. The study sample was 147 4- to 6-year-olds (M = 67.53 months, SD = 7.41 months, 70 females and 77 males). All children were Mandarin native speakers from middle-class families. None had developmental disorders, according to the class teacher's report. All children received a task with counterbalanced additive and subtractive counterfactual questions. They also received tasks assessing verbal short-term memory, response inhibition, and receptive vocabulary. Generalized estimating equations tested whether counterfactual reasoning, in general, was associated with other cognitive abilities and whether a logical structure (additive/subtractive) interacted with cognitive abilities in predicting counterfactual reasoning. The results showed that counterfactual reasoning, regardless of logical structures, was significantly associated with response inhibition. Also, there was a marginally significant logical structure × verbal short-term memory interaction. Verbal short-term memory was significantly associated with subtractive counterfactual reasoning. In contrast, it was not significantly associated with additive counterfactual reasoning. The findings suggested that counterfactual reasoning might involve deliberate control of automatic responses. Also, relative to additive counterfactual reasoning, verbal short-term memory might be more important for subtractive counterfactual reasoning. This might be because there are more semantic cues for inferring counterfactuality in subtractive than additive counterfactual premises in Chinese. Future studies may test whether the findings are specific to Chinese or general across languages. They help understand how children in different linguistic environments engage in different types of counterfactual reasoning.

Keywords : Chinese language, counterfactual reasoning, response inhibition, verbal short-term memory
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