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Brief Report

Children's sensitivity to circular explanations

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Abstract

The ability to evaluate the quality of explanations is an essential part of children's intellectual growth. Explanations can be faulty in structural ways such as when they are circular. A circular explanation reiterates the question as if it were an explanation rather than providing any new information. Two experiments ($N = 77$) examined children's preferences when faced with circular and noncircular explanations. The results demonstrate that a preference for noncircular explanations is present, albeit in a fragile form, by 5 or 6 years of age and that it appears robustly by 10 years of age. Thus, the ability to evaluate the quality of explanations based on structural grounds appears to develop rapidly during the elementary school years.

Keywords: Circularity; Structural properties; Explanation; Knowledge acquisition; Middle childhood; Cognitive development

Introduction

Young children will often ask why things are the way they are or how things work, and they ask about an enormous range of objects around them (Callanan & Jipson, 2001; Greif, Kemler Nelson, Keil, & Gutierrez, 2006). Moreover, they are often unsatisfied with the first explanation offered and may ask for further explanations, repeating the cycle until they either reach a point where they believe a compelling explanation has been offered or

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give up in frustration. This article explores the types of explanations children find satisfying. More specifically, we ask how children become sensitive to certain structural features that make some explanations better than others by examining children's evaluation of circular arguments.

Although existing research has examined what makes some arguments better than others (e.g., Kuhn, 1992), what makes certain ideas more persuasive than others (e.g., Cialdini, 1993), and what kinds of inconsistencies children notice (e.g., Markman, 1979), these studies have tended to focus on the content of the statements rather than on more abstract structural principles associated with good and bad explanations. Less common has been work on the logical structure of sentences such as Osherson and Markman's (1975) work on contradictions and tautologies and Braine and Rumain's (1981) work on the development of the understanding of *or*. Here we focus on another structural aspect of explanations that may influence judgments of their quality—circularity.

Circular arguments are statements that draw a conclusion by reiterating the information assumed in the original question or claim without adding any meaningful new information. They can be short and simple, such as "a can opener works by opening the can," or longer and more complex, such as "a can opener works by taking the lid off the can so that the top of the can has come off." Adults often unwittingly accept and create complex circular arguments, but they also reject the simplest ones as completely uninformative, raising questions about the origins of this ability and its relationship to metalinguistic skills. Adults are sensitive to elements such as verbatim repetition and paraphrasing as an indication of an argument's circularity, yet even they display limitations in their ability to recognize pragmatic factors that influence whether an argument is truly circular (Rips, 2002). A better sense of how children's abilities might emerge comes from a brief consideration of prior work on metalinguistic and metacognitive reasoning.

Because explanations are embedded in language, the ability to evaluate structural properties of explanations relies on some degree of metalinguistic skill. Children as young as 2 years of age show rudimentary metalinguistic functioning when they are asked to give judgments of grammaticality in modeling situations. By 5 to 8 years of age, children are able to give judgments of nonstandard sentences and explain why they judge some sentences as deviant (Gleitman, Gleitman, & Shipley, 1972). This more elaborated ability may be critical in evaluating structural flaws in explanations.

Multiple sources suggest that the ability to evaluate explanations develops between 5 and 10 years of age. For example, Ruffman (1999) demonstrated that when listening to longer passages, children under 6 years of age show difficulty in detecting logical inconsistencies, such as that the same character could be both tall and short, and that this is not a result of memory limitations. Studies on evaluations of the coherence of text passages also show developmental patterns during this period (Anderson & Beal, 1995; Markman, 1977).

One particularly relevant line of research on children's awareness of structural features examined children's ability to evaluate contradictions and tautologies (Osherson & Markman, 1975). Unlike statements in which truth value is determined by context, a tautological sentence is true by virtue of its logical form and a contradictory sentence is false by virtue of its logical form. When 8-year-olds were asked whether they thought the information in tautologies and contradictions was *true*, *false*, or something about which they *can't tell*, they had difficulty in evaluating both the contradictions and the tautologies. Because some statements containing nontautologous and noncontradictory statements, such as "either this chip is green or it is blue" and "this chip is yellow and it is not red," were