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Brief article

Sample diversity and premise typicality in inductive reasoning: Evidence for developmental change ☆

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Abstract

Evaluating whether a limited sample of evidence provides a good basis for induction is a critical cognitive task. We hypothesized that whereas adults evaluate the inductive strength of samples containing multiple pieces of evidence by attending to the relations among the exemplars (e.g., sample diversity), six-year-olds would attend to the degree to which each individual exemplar in a sample independently appears informative (e.g., premise typicality). To test these hypotheses, participants were asked to select between diverse and non-diverse samples to help them learn about basic-level animal categories. Across various between-subject conditions ($N = 133$), we varied the typicality present in the diverse and non-diverse samples. We found that adults reliably selected to examine diverse over non-diverse samples, regardless of exemplar typicality, six-year-olds preferred to examine samples containing typical exemplars, regardless of sample diversity, and nine-year-olds were somewhat in the midst of this developmental transition.

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1. Introduction

Inductive reasoning is central to human learning, as most of the knowledge we possess is acquired via inductive inferences rather than through direct instruction or observation. Thus, there has been considerable interest in understanding the basis of inductive reasoning processes throughout development. The question of how inductive reasoning skills develop relates to a major theoretical debate in the field of cognitive development regarding the relative contributions to development of knowledge enrichment and of conceptual change. Do young children generalize knowledge using the same reasoning mechanisms as adults do (sometimes arriving at different conclusions due to limitations in their knowledge base), or does young children's inductive methodology differ systematically from the adult approach (e.g., Carey, 1985; Heit, 2000; Viale & Osherson, 2002)? Within this framework, the goal of the present research was to examine developmental changes in how individuals approach a key challenge of inductive reasoning—determining whether limited evidence provides a strong sample on which to base broader generalizations.

1.1. Adults' criteria for evaluating samples

As discussed by Heit (2000), adults have different strategies for evaluating samples that contain single versus multiple pieces of evidence. For example, to evaluate whether a single bird is informative about all birds, adults usually consider how typical the given exemplar is of the category "birds," and base generalizations on typical exemplars (e.g., robins) more than atypical exemplars (e.g., penguins, Rips, 1975). When evaluating samples containing multiple pieces of evidence, however, adults do not simply sum the typicality of each of the given exemplars; rather, they focus on group-level properties.

To illustrate this distinction, consider the following inductive problem: If a person wants to learn about a biological property of mammals, is it better to examine a sample containing a lion and a tiger, or a sample containing a whale and a llama? Lions and tigers are likely to be perceived as more typical of the category 'mammal' than are either whales or llamas (e.g., Barr & Caplan, 1987; Diesendruck & Gelman, 1999). Yet, as described by Osherson, Smith, Wilkie, Lopez, and Shafir (1990), the sample of a whale and llama seems relatively more informative in this case because adults evaluate multiple-exemplar samples by attending to the extent to which the given exemplars, together, *cover* the relevant inclusive category. Whales and llamas provide broad coverage of mammals in that they represent very different kinds of mammals. Viewing diverse samples as more informative is a robust phenomenon among adult populations (Heit & Feeney, 2005; Kim & Keil, 2003; Lopez, 1995; but see Medin, Coley, Storms, & Hayes, 2003, for a description of cross-cultural var-