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Is the bias for function-based explanations culturally universal? Children from China endorse teleological explanations of natural phenomena



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ABSTRACT

Young children in Western cultures tend to endorse teleological (function-based) explanations broadly across many domains, even when scientifically unwarranted. For instance, in contrast to Western adults, they explicitly endorse the idea that mountains were created for climbing, just like hats were created for warmth. Is this bias a product of culture or a product of universal aspects of human cognition? In two studies, we explored whether adults and children in Mainland China, a highly secular, non-Western culture, show a bias for teleological explanations. When explaining both object properties (Experiment 1) and origins (Experiment 2), we found evidence that they do. Whereas Chinese adults restricted teleological explanations to scientifically warranted cases, Chinese children endorsed them more broadly, extending them across different kinds of natural phenomena. This bias decreased with rising grade level across first, second, and fourth grades. Overall, these data provide evidence that children's bias for teleological explanations is not solely a product of Western Abrahamic cultures. Instead, it extends to other cultures, including the East Asian secular culture of modern-day China. This suggests that the bias for function-based explanations may be driven by universal aspects of human cognition.

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Introduction

Suppose I pitched my foot against a stone, and were asked how the stone came to be there: I might possibly answer that it had lain there forever. But suppose I had found a *watch* upon the ground. . . . I should hardly think of the answer which I had before given. Yet why should not this answer serve for the watch as well as for the stone? For this reason, and for no other, viz. that, when we come to inspect the watch, we perceive that its several parts are framed and put together for a purpose.

[William Paley (1802/1998, chap. 1)]

Function-based or *teleological* explanations form a fundamental part of adults' intuitive understanding of the world. We commonly use functions to explain artifacts such as tools: A bottle exists to transport water, a mug has a handle so one can hold it when it is hot, and a watch exists to tell time (e.g., Dennett, 1987; Paley, 1802/1998). Similarly, adults use functions to explain biological properties, for example, the idea that the heart exists to pump blood (e.g., Allen, Bekoff, & Lauder, 1998; Mayr, 1985; Sober, 1984). In contrast, when teleological explanations are used to explain the properties of natural objects, they are often explicitly judged as incorrect by adults and viewed as scientifically unwarranted (Kelemen, 1999a, 1999b, 1999c, 2003; Kelemen & Rosset, 2009). Thus, a mountain is not tall so that we can hike on it; the ability to allow for hiking did not cause the mountain to exist. Instead, the existence and properties of natural objects such as mountains are caused by non-teleological, physical-causal processes.

How do such complex teleological and physical explanatory frameworks develop during childhood? Like adults, children divide up the world into ontological kinds—such as artifacts, animals, and natural objects—and form intuitive mental theories of each domain (Carey, 1985, 2009; Gopnik & Meltzoff, 1997; Keil, 1989; Kelemen & Carey, 2007; Wellman & Gelman, 1992). However, young children appear to develop a general bias toward teleological explanations early in life, such that they prefer teleological explanations over physical-causal explanations across multiple domains (DiYanni & Kelemen, 2005; Kelemen, 1999a, 2003; Kelemen & DiYanni, 2005; but see Greif, Kemler Nelson, Keil, & Gutierrez, 2006, and Keil, 1992). When given the choice between function-based and physical explanations, or when asked to generate their own verbal accounts, young children in the United States and the United Kingdom endorse teleological ideas to explain not only artifacts and biological kinds but also nonliving natural phenomena (Kelemen, 1999b, 1999c, 2003; Kelemen & DiYanni, 2005). For example, children often endorse the idea that mountains exist for climbing just like hats exist for warmth.

By one account, termed *promiscuous teleology*, children's broad teleological bias is thought to arise as a product of their early understanding of intentionality, agency, and goal-directed action (Kelemen, 1999a, 1999b, 2004, 2012; see Atran, 1995, and Keil, 1992, for accounts of a more selective bias). By this account, children use teleological explanations when unwarranted due to the combination of two factors. First, children lack detailed knowledge of the physical mechanisms that account for the properties and origins of the natural world. Second, from infancy, children intuitively understand other agents' intentional behavior, including that other agents create and use objects as tools to achieve goals, and as a result privilege these types of explanations (Casler & Kelemen, 2005, 2007; Futó, Téglás, Csibra, & Gergely, 2010; Hernik & Csibra, 2015; Kelemen, 2012; Meltzoff, 1995; Phillips, Seston, & Kelemen, 2012; Stavans & Baillargeon, 2016). Thus, when confronted with questions about other aspects of the natural world, children fill their explanatory gap with what they know—their theory of animate agents and tools, which rests on functions and goals—and generate a teleological explanation.

Cross-cultural evidence: Testing the origins of teleological bias

In every culture examined, children appear to have an early-developing understanding of agents and intentional actions (e.g., Hungary: Gergely, Nádasdy, Csibra, & Biró, 1995; Japan: Kamewari, Kato, Kanda, Ishiguro, & Hiraki, 2005; Korea: Kim & Song, 2015; Germany: Sodian, Schoeppner, & Metz, 2004; United States: Brandone & Wellman, 2009; Woodward, 1998). Thus, if the promiscuous teleology account is correct that the teleological bias arises from early understanding of agents and

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