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Whom do children copy? Model-based biases in social learning

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ABSTRACT

This review investigates the presence of young children's model-based cultural transmission biases in social learning, arguing that such biases are adaptive and flexible. Section 1 offers five propositions regarding the presence and direction of model-based transmission biases in young children's copying of a model. Section 2 discusses the cognitive abilities required for differing model-based biases and tracks their development in early childhood. Section 3 suggests future areas of research including considering the social aspect of model-based biases and understanding their use within a comparative perspective.

Introduction

Social learning is ubiquitous in humans, and fundamental to children's development, but alone cannot explain the unique stability and diversity of human culture. Research from a plethora of academic disciplines investigating cultural evolution has escalated in recent years (Boyd, Richerson, & Henrich, 2011; Whiten, Hinde, Laland, & Stringer, 2011), increasing our understanding of the circumstances that facilitate social learning. Theoretical models of cultural evolution predict the evolution of flexible strategies enabling avoidance of unreliable or redundant information, and influencing the circumstances under which individuals copy others (Boyd & Richerson, 1985). Thus, social learning is not seen as inherently beneficial and must be used selectively in the context of the observer's environmental and model-based cues (characteristics of a demonstrator exhibiting a behaviour pattern). The use of such cues in guiding behaviour is known as 'cultural transmission biases' (Boyd

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& Richerson, 1985, also termed 'social learning strategies'; Laland, 2004) and allows populations to approach adaptive optima much faster than they otherwise would under individual learning (Mesoudi & O'Brien, 2008) or unbiased social learning in which individuals acquire variants according to the frequency at which they are practiced (Rendell et al., 2011).

The adaptive value of model-based biases have been investigated in disciplines such as evolutionary biology, anthropology and non-developmental domains of psychology. Model-based biases have been described as 'who' biases (Laland, 2004), indirect biases (Boyd & Richerson, 1985) and context dependent model-based biases (Henrich & McElreath, 2003). Within developmental psychology it has long been established that it is important to understand whom children learn from, and that children's learning entails 'an active construct of the model by the individual' (Užgiris, 1981, p. 2). As children develop they constantly witness alternative methods of achieving a goal. This has been mirrored in experiments where children witness divergent information from different models relating to tool-use (Wood, Kendal, & Flynn, in preparation), and labels for elements in the environment (Koenig, Clément, & Harris, 2004). When faced with divergent information it would be adaptive to select and reproduce the information that achieves the outcome most suited for one's needs, but this can be complex. Models have different characteristics that influence our choice, including their previous performance, knowledge state, age, sex and social status. Furthermore, observers' own characteristics may influence who is the 'best' model for them. The potential list of relevant characteristics is endless and a naïve individual needs to evaluate these characteristics so that the behaviour of the most appropriate model, potentially providing the most useful and adaptive behaviour, is adopted.

This review uses an evolutionary approach to understand how model characteristics bias the likelihood that an observing child copies modelled behaviour. We define copying as a broad behaviour of a child either matching the behaviour of a model or preferentially selecting one model's behaviour (e.g. a novel object is given a different word label by two models and when prompted, the child repeats one of the models' word labels). Copying is an important mechanism in children's social learning. Whilst focusing on instances of copying a model, we acknowledge that children are able to learn behaviour without necessarily reproducing every aspect of a demonstration (Bekkering, Wohlschläger, & Gattis, 2000; Flynn & Whiten, 2008; Williamson, Meltzoff, & Markman, 2008) and that copying a model may serve a function beyond simply learning behaviour (Over & Carpenter, 2012). In Section 1 we argue that model-based biases enable children to gain the most useful information pertaining to their environment; hence a model-based bias may be viewed as an adaptive cognitive tool. Throughout this review, adaptive means that the model-based bias contributes to an individual's survival by either providing them with more useful behaviours within their environment, or enabling greater avoidance of unreliable or redundant information, than if such a model-based bias did not exist. In Section 2 we describe the developmental shift in the implementation of model-based biases, demonstrating increasingly flexible implementation. We conclude in Section 3 by discussing future considerations and directions.

Section 1: The adaptive value of model-based biases

In this section we make five propositions regarding the adaptive value of model-based biases. To begin, we examine children's biases towards models whose behaviour indicates their desire to transfer information, namely children's receptiveness to pedagogical cueing. Second, we consider children's ability to evaluate and copy the most proficient individual before moving onto discussing characteristics that identify models as belonging to groups with certain reputations that may guide children's copying. Fourth, we argue that the more similar a model is to a child, the more suitable s/he might be as a model, before finishing by discussing children's biases towards models that are prestigious.

Proposition 1: Children are biased towards those who intend to teach

Csibra and Gergely (2009) argue that children have an innate predisposition for receptiveness towards people's ostensive signals indicating that the person is trying to communicate relevant information. These cues may include pointing, eye contact, and verbal directions. If a person is actively trying to communicate information then, generally, the person is communicating information about the