



Pergamon

Learning and Individual Differences
12 (2002) 317–345

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Individual Differences**

Principles of evolutionary educational psychology

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Received 13 July 2001; accepted 31 January 2002

Abstract

Evolutionary educational psychology is the study of the relation between evolved systems of folk knowledge and inferential and attributional biases as these relate to academic learning in modern society. Following discussion and illustration of the mechanisms of natural selection and their application to human motivational, cognitive, and behavioral evolution, the basic premises and principles of evolutionary educational psychology are outlined. The gist is that the evolved cognitive systems and inferential biases that define folk knowledge are not sufficient for academic learning, but, at the same time, are the foundation from which academic competencies are built. A theoretical frame outlining the relation between folk knowledge and academic development is proposed and implications for motivational issues and instructional practices are detailed. © 2002 Published by Elsevier Science Inc.

Keywords: Evolution; Cognition; Folk knowledge; Academic learning; Educational psychology

1. Introduction

The principles of natural and sexual selection are being used to guide theoretical and empirical research in the behavioral and social sciences with increasing frequency (e.g., Buunk, Angleitner, Oubaid, & Buss, 1996; Gangestad & Thornhill, 1998; Geary, 1998a; Pinker, 1997; Taylor et al., 2000). Nearly all of this research has focused on social behavior, cognitive mechanisms, and other phenomena that are thought to be evolved and universal adaptations, that is, features of human behavior (e.g., language) that are evident in all cultures (e.g., Tooby &

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Cosmides, 1995). The search for universal adaptations has generated both controversy and substantive theoretical and empirical advances. At the same time, the focus on universal adaptations has directed attention away from an equally important issue, that is, the relation between evolved social and cognitive biases and the expression and acquisition of culturally specific behaviors and cognitions (Flinn, 1997). Of particular relevance to modern society is the relation between evolved social and cognitive biases and children's motivation and ability to learn in school (Geary, 1995), as school-taught competencies influence employability, wages, and the ease of day-to-day living in these societies (e.g., Grogger & Eide, 1995).

Accordingly, the goal here is to develop a theoretical framework that outlines the relation between universal social and cognitive adaptations and academic learning, and provides direction for future instructional research. To fully comprehend the foundations of the model, a primer on the mechanisms of natural and sexual selection in general and as related to human evolution in particular is needed and provided in the first part below. The basic premises and principles of evolutionary educational psychology are provided in the second part, along with discussion of related motivational and instructional implications.

2. Evolution of behavior and cognition

The goal of this section is to provide a basic conceptual frame for understanding the evolved functions of behavior and cognition. The frame provides the needed context for contrasting the academic demands in modern schools with the inherent motivational, cognitive, and behavioral biases of children, as these would be expressed in ecologies more similar to those in which humans evolved (Geary & Bjorklund, 2000). The Section 2.1 provides a primer on selection mechanisms and Section 2.2 outlines a model of evolved motivational, cognitive, and behavioral systems in humans. These evolved systems provide the scaffolding upon which many academic competencies are built.

2.1. Principles of evolutionary selection

2.1.1. Basic mechanisms

The fundamental observations and inferences that led to the insights of Darwin (1859) and Darwin and Wallace (1858) regarding natural selection and evolutionary change are shown in Table 1. Of particular importance is individual differences, which largely result as a consequence of sexual reproduction (e.g., Hamilton & Zuk, 1982; Williams, 1975). "These individual differences are of the highest importance for us, for they are often inherited, as must be familiar to every one; and they thus afford materials for natural selection to act on and accumulate" (Darwin, 1872, p. 34). The process of evolutionary selection occurs when variability in a characteristic, such as beak size (see below), covaries with variability in survival prospects (Price, 1970). If the characteristic is inherited, then the survivors will produce offspring who also have a somewhat shorter (or longer) beak than did less successful conspecifics (i.e., members of the same species). If the characteristic continues to covary with survival prospects in the offspring's generation, then the process will repeat itself. Over many

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