

Cultural evolution in laboratory microsocieties including traditions of rule giving and rule following

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Received 12 June 2003; accepted 12 May 2004

Abstract

Experiments may contribute to understanding the basic processes of cultural evolution. We drew features from previous laboratory research with small groups in which traditions arose during several generations. Groups of four participants chose by consensus between solving anagrams printed on red cards and on blue cards. Payoffs for the choices differed. After 12 min, the participant who had been in the experiment the longest was removed and replaced with a naïve person. These replacements, each of which marked the end of a generation, continued for 10–15 generations, at which time the day's session ended. Time-out duration, which determined whether the group earned more by choosing red or blue, and which was fixed for a day's session, was varied across three conditions to equal 1, 2, or 3 min. The groups developed choice traditions that tended toward maximizing earnings. The stronger the dependence between choice and earnings, the stronger was the tradition. Once a choice tradition evolved, groups passed it on by instructing newcomers, using some combination of accurate information, mythology, and coercion. Among verbal traditions, frequency of mythology varied directly with strength of the choice tradition. These methods may be applied to a variety of research questions. © 2004 Elsevier Inc. All rights reserved.

Keywords: Experiments; Cultural evolution; Rules; Reinforcement; Outcomes; Evolutionary psychology

1. Introduction

In their book, *Culture and the Evolutionary Process*, Boyd and Richerson (1985) summarized much of the theoretical work and field research that has addressed cultural

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evolution (see also Cavalli-Sforza & Feldman, 1981; Durham, 1991). Almost all of the laboratory research on social learning (e.g., Heyes & Galef, 1996; Rosenthal & Zimmerman, 1978) focuses on the individual-level mechanisms by which one organism acquires behavior from another. Remarkably little experimental research addresses the evolutionary question of how these individual-level mechanisms contribute to phenomena at the population level. Approaching cultural traditions and their change over time from a population-level perspective, anthropologists, historians, and other social scientists have sometimes discussed processes at the individual level but have often been unconcerned with or hostile to attempts to generalize about cultural evolutionary processes.

Perhaps the single most neglected field of empirical investigation in evolutionary social science is the study of the processes of cultural microevolution. How do individual-level processes, such as the choices individuals make when they imitate or take instruction from others, contribute to incremental changes in cultural traditions at the population level? Such microevolutionary studies are the bedrock of our understanding of organic evolution. Endler (1986) and Brandon (1990) provided excellent discussions of the centrality of studying microevolutionary processes in organic evolution. Some traditions of research in the social sciences approximate organic microevolutionary studies; examples include those of sociolinguists (Labov, 2001; Thomason, 2001), investigations of the diffusion of innovations (Rogers & Shoemaker, 1971), Martindale's (1975, 1990) dissections of aesthetic evolution, and certain studies of the sociology of religion (Roof & McKinney, 1987; Stark, 1997; Wilson, 2002). With the exception of Wilson's (2002) work, none of these studies derives from a sophisticated theory of cultural evolution. Only a handful of studies have so far connected the emerging theory of cultural evolution to empirical cases (Henrich, 2001; Hewlett & Cavalli-Sforza, 1986; McElreath, submitted).

Field investigations of cultural microevolution are limited by the complexity of field situations. Although cultural evolution is relatively rapid, it is often too slow to be observed during the period of one research grant. Key situations may be difficult to observe, as when, in language evolution, the presence of observers inhibits people from speaking their normal dialect. Deliberate control of critical variables is normally impossible. When more controlled studies are necessary to settle questions in evolutionary biology, experiments on caged populations of *Drosophila*, test tubes of *Escherichia coli*, and other laboratory systems are pressed into service. For cultural evolution, Jacobs and Campbell (1961) pioneered an analogous technique.

Jacobs and Campbell (1961) began a tradition of an exaggerated visual illusion in a small group of subjects by composing the initial group primarily of stooges who publicly reported exaggerated estimates. The naïve members went along with the stooges initially, but as the stooges were replaced periodically with new naïve subjects, and then initially naïve subjects with new naïve subjects, the magnitude of the illusion reported gradually decreased to normal levels. The exaggeration persisted, however, for several replacements ("generations") beyond the elimination of all stooges, suggesting some tendency for the tradition, once established, to be transmitted.

Our main argument in this paper is that the laboratory microsociety experiment is a flexible tool for examining many aspects of cultural transmission under controlled conditions. We

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