Chapter VI

Unique Applications of Multi-Agent Models in Uncovering Language Learning Processes

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Abstract

Multi-scale “artificial societies” are constructed to examine competing first- and second-language acquisition-based theories of creole language emergence. Socio-historical conditions and psycho-linguistic capacities are integrated into the model as agents (slaves and slave-owners) interact. Linguistic transmissions are tracked, and grammar constructions are charted. The study demonstrates how a complex adaptive system (CAS) approach offers clear indications for computational solutions to questions of language change and formation.
Introduction

How does a fully operational and accepted linguistic code evolve out of the complexity of multiple languages and cultures in contact? What principles or mechanisms make such language development possible, both at the individual (cognitive) and at the societal level? Various hypotheses offer explanations for how historical creole languages arose under precisely such “chaotic” language contact settings, notably in plantation scenarios. Since creoles are not exactly the same as any of the first language (L1) source languages from which they emerge, creolists support the notion of creoles as adult manifestations of unsuccessful or “imperfect” efforts at second language (L2) acquisition. These “flawed” attempts are claimed to gradually converge to a new code over the span of several generations of speakers (Arends, 1995; Chaudenson, 1992, 1995; Mufwene, 1996; etc.). The language bioprogram hypothesis (Bickerton, 1981, 1984, 1988) is a competing account which suggests that plantation creoles arise within one generation, and only when young children exposed to impoverished or otherwise deficient primary linguistic input “compensate” by creating a novel L1 from their immigrant parents’ “defective” L2. A long-standing challenge for creole studies has been how to reliably test the two theories, due to obstacles such as imperfect records of speakers inhabiting historical plantation communities, the extinction of early and intermediate linguistic forms, along with the added questions of creole studies’ place within larger disciplinary contexts such as L1 and/or L2 language acquisition theories.

The general purpose of the current research is to shed light on underlying assumptions of language acquisition theories and to serve as a “barometer” for specific proposals concerning creole formation. We start from the premise that language acquisition, with its complex sets of linguistic processes, as mediated by internal and external factors extending across multiple timescales, can be fruitfully analyzed as a CAS (e.g., Satterfield, 1999a,b, 2001, 2005a, 2005b, in press). For the scope of this work, a CAS is defined as a dynamical network whose emergent properties are produced bottom-up by the simple interactions of many individual elements. A CAS is complex in that it is diverse and made up of multiple interconnected units; it is adaptive in that it has the capability to evolve and to “learn” from experience within a changing environment (Bradbury, 2002; Holland, 1998). While the CAS approach has been applied in several linguistic projects concerning human language evolution (Bartlett & Kazakov, 2004; Briscoe, 2000, 2002; Culicover & Nowak, 2002; Kirby, 1999; Steels, 1997), the present study takes model validity as a key feature (Burton & Obel, 1995); focusing on an application that, while a simplification of the system that it is designed to mimic, still adheres to reality. The intent is to provide a principled explanation for real-world linguistic processes and components at a basic level. Phenomena observed in real-world language acquisition fall naturally into the category of CAS, providing a window into linguistic development at several
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