

# Appendix

## Developmental Issues

Elena Lieven

with contributions from Morten H. Christiansen, Emma Flynn, Daniel Haun, Robert McCauley, Victoria Reyes-García, Pete Richerson, Claudio Tennie, Harvey Whitehouse, and Polly Wiessner

The basic argument put forth in this book is that many aspects of human endeavor can be better understood by adopting a cultural evolutionary perspective (see Richerson and Christiansen, this volume). The basic approach taken was to concentrate on four focal topics: social systems, technology, language, and religion. However, a number of issues cut across these areas; in particular, as relates to human development in infants, children, and adolescents. As an impetus for further discussion, this Appendix highlights some of these issues, starting with three general questions before moving to brief discussion of a number of more specific points:

1. Do the mechanisms of cultural evolution play similar roles in the acquisition of different cultural behaviors (e.g., language, tool use, social norms)?
2. How does the construction of the child's world by adults affect cultural evolution (Flynn et al. 2012)?
3. What can the different cultural practices used during childhood tell us about cultural evolution in different domains?

### **Biological Evolution**

There is a huge literature on the biological changes that have occurred in human evolution and which underpin the extended learning period that is of such importance in cultural evolution (e.g., neotony, large brains, brain plasticity, and the length of the juvenile period) (for a review, see Locke and Bogin 2006). We will not reiterate these here. However, an area that warrants further investigation is whether there are specifically human characteristics of puberty which might have important implications for cultural evolution.

For example, are there particular ways in which adolescents confront or change norms and/or innovate which should be considered by explanations of cultural evolution? A second example is that the age of puberty in technological cultures has fallen dramatically (for girls, at least) over the last hundred years. Does this have implications for cultural evolution, and, if so, what are

they? More generally, what role does the timetable of biological development play in understanding cultural evolution? For instance, if the prefrontal cortex is not fully mature until a person is in their mid-twenties, this covers the same time period as the transition to full adulthood. It would be interesting to work out the implications of this. Is this a particularly experimental/innovative stage of human development across cultures?

### **How Do We Measure Childhood across Cultures?**

Different cultures have very different definitions of childhood and different expectations about when a person leaves childhood to become a full member of society, with rights and obligations) (e.g., Lamb and Hewlett 2005; Konner 2010). Variations in definitions of childhood as well as in the ages at which the following occur are important as are any universal regularities. Given this, is it methodologically possible to attempt a universal definition of childhood? Some ideas for further consideration:

- The end of childhood could be defined as the point in time when an individual produces a net gain of calories; that is, when energy production is higher than energy consumption (cf. Kaplan 1997; Kramer 2011).
- Many cultures have rites of passage into adulthood, particularly for boys. Are there commonalities in the age at which these occur and what other factors might modulate this?
- Is the average age of marriage correlated with net energy production and/or changes in the relations between the parental generation and children in terms of labor contribution?
- Are changes in rights and obligations between parental and child generations, which may signal the end of cultural childhood, related to the age at which the first child is born?

### **Adaptation of Human Systems to be Learned by Human Cognitive Apparatus**

In theories of language evolution, a well-developed position suggests that language has evolved to be learnable by the human cognitive apparatus; that is, language has been shaped by just those cognitive biases that children bring to learning it (for a review, see Christiansen and Chater 2008). This then places constraints on the kinds of language systems that can emerge. Can these ideas be extended to other aspects of cultural evolution?

It is important, however, to point out that just because something is easy to learn does not mean that it will be propagated. This will depend on the broader landscape of constraints and biases, and much work remains to be done on how this might play out in terms of the interaction between learning and cultural evolution. In addition, although, other things being equal, we will be biased to

learn what is easy to learn in a domain, there will be exceptions when some form of social selection favors learning hard things as a social signal. For instance, if learning to speak “well” is used as a social sign of intelligence (as it certainly used to be in the British educational context), then competition to speak “better” than others could lead to the evolution of aspects of language that are hard to learn. One theory we could have about why English spelling is much harder than it needs to be is that being able to spell accurately is a sign of educational accomplishment. Perhaps every language has some hard elements just to serve this function. Similarly, this may also apply for other domains of culture (e.g., medicine, the legal world, engineering).

### **Is There a Universal Basis for Cultural Learning?**

Despite considerable differences in the ways in which infants are cared for during the first year of life, current evidence suggests a near universal timetable for the emergence of basic sociocognitive skills involving the communication and reading of intentions: joint attention, pointing, imitation, collaboration (Lieven, this volume; Callaghan et al. 2011). These appear to be the foundational skills for many aspects of cultural evolution and to be uniquely characteristic of human development, in that they are found for all typically developing infants, and show a reliable timetable of emergence. Arguably, they underpin the capacity for acquiring nongenetically coded information, which must be at the root of human cultural evolution (Konner 2010, especially Part IV on Enculturation). However, more research is needed on within- and across-cultural differences in learning strategies for acquiring information. What may start out as universals of development (or small differences) could be amplified by the environment (e.g., demonstrated differences in early language attainment as a function of social economic status).

### **What Role Do Children Play in Promoting/ Restricting Cultural Variation?**

Haun and Over (this volume) suggest that children restrict in-group variation but contribute to cross-cultural variation. Norms, the enforcement of norms, ostracism aversion, and the identification of social in-groups and out-groups are argued to underpin cooperation in small-scale societies and the development of institutions in the move to large-scale societies. Thus, Haun and Over (this volume) argue that from “early in development, children prefer to interact with, and learn from, individuals who are similar to themselves”; they are “ostracism averse” and they “show a tendency to match their behavior to that of the majority.” The suggestion is that this maintains culture-specific characteristics and thus promotes variation between cultures upon which selection can operate (Whiten and Flynn 2010). On the other hand, a number of sociolinguists have suggested that adolescents are at the forefront of propagating

language changes which are already in progress (see, e.g., Labov 1982). In contrast, Christiansen and Chater (2008) argue that the human cognitive apparatus restricts what can be learned and thus shapes the universal features of language in a probabilistic manner. Thus general learning biases may provide a regularizing pressure on cultural evolution, not only in the case of children (Chater and Christiansen 2010) but also through adult second language learners (Lupyan and Dale 2010). Clearly, there are important issues to be addressed here in terms of the ways in which human development may restrict or promote innovation and variation, how this may change across the lifespan, the role of prior states of the system (in terms of knowledge, skills, etc.), and how this impacts on different aspects of cultural evolution.

### **Childhood: The Period during which Children Become or Develop “Embodied Capital”**

Is the length of childhood related to the overall complexity of society? The suggestion is that one of the landmark accomplishments in human cultural evolution was the creation of cultural means for prolonging childhood, and that this goes hand-in-hand with the development of complex technology. Hugely significant in this respect was the invention of writing systems, the development of literacy and, much later, the invention of the printing press with the consequent proliferation of books and the laborious process of teaching and learning to read. In its turn, this may have given rise to new forms of human conceptual and cognitive processing. New cognitive skills such as reading and mathematics are unlikely to be the result of biological adaption since the time span is too short. Instead they most likely involve the formation of novel networks via recruitment during development of prior brain areas (e.g., as suggested by Dehaene and Cohen 2007).

Relating the length of childhood to the level of complexity in a society can, in principle, be tested. Kaplan and Lancaster (2003) have looked at the caloric productivity of people in small-scale simple societies as a function of age. They found that children do not become net producers until about age 18 and do not peak until age 30 or so. However, when production is evaluated in terms of time children spend in economic activities, children become net producers much earlier (Kramer 2011). This may be a more inclusive measure of children’s roles since in most smaller-scale societies they spend more time in food-processing activities than food procurement.

The main differences in complex societies seem to be in formal teaching and written storage. Arguably, children in formal education learn more per unit time. Written records reduce the burden on memory, which is presumably greater for those who cannot read, but there is also the issue of whether there are differences between simple and complex cultures in how much needs to be remembered.