

Socio-Historical Change and Cognitive Development

Essay Review of *Weaving Generations Together: Evolving Creativity in the Maya of Chiapas* by Patricia M. Greenfield¹

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Everyone interested in the cross-cultural study of cognitive development, everyday cognition, informal education, and learning processes will remember the landmark paper by Greenfield and Lave, first published in French [1979] and later in English [1982]: *Cognitive Aspects of Informal Education*. Together with some other research reports [e.g., Greenfield & Childs, 1977] and theoretical discussions on learning processes [Greenfield, 1984], the paper described a landmark research program carried out in 1969–1970 in Zinacantán, a remote highland village in Chiapas, Mexico. It was one of the first field-studies using video recordings for micro-analysis of learning processes, and proved fundamental in the development of research on everyday cognition.

Well, Patricia Greenfield has done it again! She went back to the same village 21 years later, and the outcome (reported in this book) will no doubt be path-breaking once more.

I summarized this important research earlier in Segall, Dasen, Berry and Poortinga [1999, pp. 80f, 190–193], but the publication of this volume now adds many more details to the second part of the fieldwork, particularly illustrations of the increasing rate of change over the last decades in the patterns that are woven and now also embroidered. In the 1970's, the Zinacantec women basically produced only very few patterns of cloth involving red and white stripes. Young girls learned to respect the tradition and to weave these patterns without error; the teaching-learning process was based mainly on *scaffolding*, in which calibrated adult intervention allows the learner to complete a difficult task (such as weaving real cloth on an adult backstrap loom). Scaffolding implies that the adult continuously assesses the ability level of the learner, intervening less and less in the course of the apprenticeship until the girl can weave alone. Greenfield hypothesized that scaf-

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folding is congruent with a value system oriented toward the maintenance of traditional ways, while trial-and-error learning is more common when innovation is valued.

While Greenfield was away studying other topics, Zinacantán underwent radical socio-economic change. The village became a town with easy access to nearby San Cristobal and beyond, and subsistence changed from self-sufficient agriculture to a cash economy; weaving was no longer geared to producing only the family's clothing, with a very limited number of patterns, but became a means of livelihood for at least some of the families. In fact, women now had more time for weaving, since electricity and water adduction had reduced their domestic workload. The materials had become cheaper; locally produced wool or relatively expensive red and white store-bought cotton was replaced by less expensive store-bought acrylic yarn in a variety of colors. Furthermore, the textile products could fetch an income when sold either to outsiders or to other Zinacantecs.

When Greenfield learned of this enormous social change, she asked herself whether the learning styles and the cognitive processes would have changed as a consequence. This is what she set out to test in the extensive follow-up study reported in this volume and in several research papers [e.g., Greenfield, 1999, 2000, 2001; Greenfield, Maynard, & Childs, 2003]. The book is illustrated by photographs from different periods of time but most remarkably by beautiful pictures taken by Lauren Greenfield (whose experience with National Geographic shows through in every shot).

A chapter is devoted to demonstrating the dramatic increase in the rate of change of the woven and embroidered patterns in the last few decades. While the basic structure of Zinacantec weaving still makes it distinct from others, red became predominant in the 1990's, with elaborate hand- or machine-produced embroideries. In the latest examples, woven in the past few years, even a change to blue and a breaking of the patterns of symmetry can be seen. Another chapter shows how the inspiration for the patterns now comes from multiple outside sources, sometimes even printed patterns bought in Mexico City. Comparing these changes to those in Native American art in southwestern United States, Greenfield notices

... a movement from a definition of creativity on the level of community ('Our pottery is one way, theirs is another; our clothes are like this, theirs are like that') to a definition of creativity on the level of the family and ultimately on the level of the individual. (p.172)

Along with these socio-economic changes and shifts in textile production comes a change in children's learning processes, and this is the fascinating point for readers of this journal: no longer is scaffolding the norm, but, rather, more individual, trial-and-error learning. Instead of the mother assessing continuously the child's level of competence in order to adapt her own interventions, the learner has to decide by herself if she needs help, and call out for it. In other words, the Zinacantec teaching/learning style has changed from Vygotskian to Piagetian!

Greenfield and her colleagues have also repeated an experiment in which weavers and non-weavers were asked to represent designs with sticks, both copying existing traditional patterns and expanding novel designs. This produces an interesting comparative study, showing that the stages of cognitive development have

remained the same over the generations, but that girls now tend to use more abstract representations (as only the schooled boys did in the first study).

'Researchers in many fields observe and comment on culture change. What they infrequently note and rarely study are historical changes in processes of cognition and learning' (p. 166). Greenfield is absolutely right in drawing our attention to the originality of her approach. Unfortunately, the details of the learning and cognition studies are not fully reported in the book, and the interested reader will have to turn to the research papers [e.g., Greenfield, 2000, 2001; Greenfield et al., 2003]. No doubt because the author wanted to produce a book for a larger public (and with the beautiful illustrations, it does resemble a coffee-table art volume) and an interdisciplinary audience, she relinquished all technical information such as statistical analyses to endnotes, and these are sometimes not very informative.

For example, on the critical issue of linking learning style to cognition, endnote 19 to chapter 5 (p. 184) states rather vaguely: 'Controlling for age, we found a significant correlation between learner independence in weaving apprenticeship and correct completions of the five culturally novel patterns (Greenfield, Maynard, and Childs, 2003)'. To find out what exactly this correlation was (namely $r = 0.45$, $p = 0.003$), we have to turn to the referenced research paper [Greenfield et al., 2003, p. 483]. Unfortunately, this direct link between learning style and cognition is not dealt with in the more sophisticated structural equation modeling used in that paper. One analysis links independent learning style to 'mother-daughter involvement in textile commerce', and another analysis links abstraction to a slightly different socio-economic measure ('family involvement in commerce'), but the much hoped-for link is, in fact, missing in these models. One reason for not providing this analysis is that structural equation modeling requires rather large samples, while, in this case, the quasi-experimental design is limited by the fact that only girls learn to weave. Given the complexity of the interlinking variables assessed in the study and the difficulty of doing such fieldwork, the sample sizes are, in fact, remarkable. The combination of qualitative observations and quantitative measures is a wonderful illustration of Greenfield's [1997] own claim that cultural and cross-cultural psychology are not incompatible.

It is true that there are very few longitudinal studies in cross-cultural psychology, and 'returning to the field' to assess social change is more common in anthropology. For example, Condon [1987, 1990] returned several times to an Inuit village and gives us a fascinating account of social change (including the impact of television) and its impact on adolescence. In research on cognitive development, the example that comes the closest to Greenfield's enterprise is the research carried out by Geoffrey Saxe among the Oksapmin of Papua New Guinea. His initial fieldwork, also in the 1970's, on the body-count number system was also a path-breaking example of carrying Piagetian theory to the field and testing it not with standardized tasks but with culturally meaningful experiments and observations. In this initial phase of research, a cross-sectional design enabled Saxe [1982] to show how, under the impact of contact with a monetary system, trade-store owners and young men who had been away working on plantations had adapted the traditional counting system to use it for arithmetic calculations. Saxe also spent 20 years studying other fascinating topics, such as the arithmetic of street children in Recife, Brazil, and then returned to his Oksapmin fieldsite. Saxe and Esmonde (in press) give us a first insight in how the monetary economy dramatically changed the use

of one of the local number terms, and a monograph in preparation is likely to reveal further fascinating cognitive effects of social change.

While reading Greenfield's research papers, and now her book, I kept thinking, quite egocentrically, how well it illustrated the theoretical framework I have been putting together [Dasen, 2003], combining other models, such as the Super and Harkness' 'developmental niche,' Berry's 'eco-cultural framework,' and Bronfenbrenner's ecological theory. In this integrated theoretical framework, the individual developing child (with particular attention to learning processes) is at the center of the concentric circles of the micro-, meso- and macrosystems. The micro-system consists of the three components of the developmental niche, namely social and physical settings, child rearing customs, and parental ethnotheories. In the mesosystem are various processes of transmission, in particular cultural transmission (enculturation, ensocialization) and acculturation. At the level of the macrosystem, we find ecological and socio-political contexts, and biological and cultural adaptation (with particular attention to cosmologies, religion and values). In this theoretical framework, there are multiple and bi-directional interactions between levels.

Every aspect of Greenfield's study fits just perfectly: at the macrolevel we have social change, with changes in the ecological and socio-historical contexts, and links with cosmology and value systems. Greenfield's study deals explicitly with the processes of cultural transmission and acculturation, and with the various aspects of the developmental niche. And finally, all these contextual and cultural aspects are linked to the microanalysis of learning styles and cognitive processes. The latter are not seen as purely the outcome of the impact of social change, but as an impetus for cognitive change in a dynamic co-construction. 'These internal changes reflect and enable changes in material culture, changes such as the development of novel and varied textile designs' (p. 166).

I believe that Greenfield's use of social change as a quasi-experiment will unfortunately remain, with a few exceptions, such as Saxe's research mentioned above, an exception rather than a trend. It is so much easier to carry out 'cross-cultural' research by sending out a questionnaire or scale by email to colleagues around the world, asking them to translate the instruments and submitting them to their students. Who is still willing to go and live in a village, learning to kneel like Zinacantec women, to try out what backstrap weaving really feels like? And to carry home hours of videotape in need of painstaking microgenetic analysis? No, I believe Greenfield's achievement will stand alone! The future will hopefully prove me wrong.

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