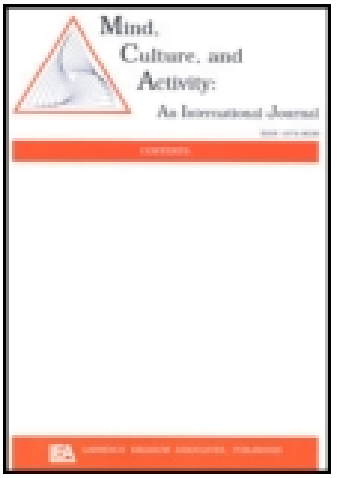

Mind, Culture, and Activity
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/hmca20

Historical change and cognitive change: A two-decade follow-up study in Zinacantan, a Maya community in Chiapas, Mexico

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Published online: 01 Sep 2009.

To cite this article: Patricia M. Greenfield (1999) Historical change and cognitive change: A two-decade follow-up study in Zinacantan, a Maya community in Chiapas, Mexico, Mind, Culture, and Activity, 6:2, 92-108, DOI: 10.1080/10749039909524717

To link to this article: http://dx.doi.org/10.1080/10749039909524717

MIND, CULTURE, AND ACTIVITY, 6(2), 92–108

ARTICLES

Historical Change and Cognitive Change: A Two-Decade Follow-Up Study in Zinacantan, A Maya Community in Chiapas, Mexico

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The Soviet psychologist and semiotician, Lev Semenovich Vygotsky (1962, 1978), pointed to the connections between cultural development and individual development. In his view, children, as they grow, acquire, through social interaction, the use of tools and speech; these cultural forms are themselves the product of historical development (Scribner, 1985). These ideas of Vygotsky form the central core of a prominent theoretical strand of developmental psychology, the sociohistorical approach (e.g., Cole, 1996; Rogoff & Wertsch, 1984; Wertsch, 1985).

Yet despite the importance of sociohistorical theory, the developmental implications of historical change have not been studied in a direct, empirical manner: by comparing the development and socialization of one generation with that of the next. Our two-decade follow-up investigation of informal education and representational strategies among the Zinacantecs, a Maya group in Chiapas, Mexico, begins to fill this gap. Across a span of more than 20 years, we have studied two generations of mothers and children as their society moves from subsistence to an entrepreneurial cash economy. Because such economic changes transform human relations, Vygotsky, in the tradition of Marx and Lenin, would have expected this economic transformation to change the social processes of ontogeny (Scribner, 1985).

In so far as the process of socialization prepares the next generation to participate in society, it should change when the conditions faced by that next generation differ from the environment in which their parents grew up. Socialization is intrinsically future oriented—it prepares children for an adulthood that has not yet arrived. It follows that changing socialization patterns should be a key component of the psychological adaptation to social change.

An important question is, in conditions of change, do parents merely recreate the socializing process that they underwent as children? Or, is there a capacity to develop new methods and processes as societal conditions, in this case, economic conditions, change? And what, if any, are the consequences of such changes in socialization for the development of children?

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There is a connection between socialization and cultural artifacts. In nonindustrial societies, children are socialized to produce cultural artifacts through a process of informal education or apprenticeship. (Here the term *artifact* is being used to encompass all humanly manufactured articles.) What is the relationship between the pedagogical methods of informal education and the nature of the cultural artifacts that are produced? Are changes in one reflected in changes in the other?

If we are to answer these questions in the most rigorous way possible, longitudinal evidence across more than one generation is required. The evidence must be both behavioral *and* historical. It is precisely this sort of controlled longitudinal, historical. behavioral data that has, up to now, been lacking. And it is precisely this kind of evidence that I present in this article.

THE STUDY

In 1969 and 1970, I carried out a number of studies of culture, learning, and cognitive development in Nabenchauk, a hamlet of the agrarian Maya community of Zinacantan. My collaborator in this research was Carla Childs (e.g., Childs & Greenfield, 1980; Greenfield, Brazelton, & Childs, 1989; Greenfield & Childs, 1977, 1991).

Our study site was Nabenchauk, a Tzotzil-speaking Zinacantec Maya hamlet in Highland Chiapas. The Zinacantecs had been very successful at carrying a traditional, albeit syncretic ancient Maya way of life into the modern world (Vogt, 1969). The community was agrarian: Corn and beans were their major and most traditional crops, supplemented by peaches in more recent years.

Weaving was the cultural domain on which our research focused. Weaving apprenticeship was utilized as a means to investigate processes of informal education, teaching, and learning in a society in which education does not traditionally take place in school. Figure 1 depicts a 1970 weaving learner seated at the prototypical Maya backstrap loom.

The design of this loom goes back to ancient Maya times. Figure 2 shows a ceramic statue, more than a thousand years old, of a woman in the same backstrap loom. The statue dates from A.D. 700–900 and is from Jaina, Campeche, Mexico, another Maya area.

1970: WEAVING APPRENTICESHIP, TEXTILES, AND CULTURAL CONSERVATISM

We concluded that the goal of Zinacantec education and socialization was the intergenerational replication of tradition (Greenfield & Lave, 1982). This was in accord with broader cultural goals of maintaining the *baz'i* or "true" way of acting; the "true" way was the Zinacantec way (Vogt, 1969). The way in which weaving was taught in 1970 fostered this goal of cultural conservation: Our video study of weaving apprenticeship revealed the instructional process to be a highly scaffolded, relatively error-free one, in which the teacher, usually the mother, sensitively provided help, models, and verbal direction in accord with the developmental level of the learner (Childs & Greenfield, 1980; Greenfield, 1984). The learner had little chance to make a mistake, let alone experiment and innovate.

FIGURE 1 Katal 1 seated at a backstrap loom, Nabenchauk, 1970. (Numerals refer to codes in our database and identify subjects by family and generation.) Photo courtesy of Sheldon Greenfield.

Thus, the maintenance of tradition excluded the value of innovative creation. The relatively conservative nature of the value system and culture was manifest in the stable repertoire of woven patterns, limited to two red-and-white striped configurations (Figure 3), one multicolor stripe (Figure 4), and one basketweave pattern (Figure 5).

1970–1991: ECONOMIC TRANSITION FROM SUBSISTENCE TO COMMERCE

Side by side with the emphasis on cultural tradition was a process of economic change, already in motion in 1970, from subsistence to commerce. This process was accelerated in the 1980s when the Mexican government made it possible for Zinacantec communities such as Nabenchauk to acquire vans and trucks. Men who were formerly farmers went into the transport business; in essence, they became entrepreneurs (Cancian, 1992). Based on the fact that commercial entrepreneurship entails an ideology of innovation, I made certain predictions about changes in informal weaving apprenticeship and changes in textiles, the artifactual products of weaving.

IMPLICATIONS OF ECONOMIC CHANGE FOR WEAVING APPRENTICESHIP AND WOVEN TEXTILES: PREDICTIONS FROM THEORY

I developed a theory (Greenfield, 1984; Greenfield & Lave, 1982) that there is a contrast between the goals of two methods of informal education: scaffolding plus observation of models,

FIGURE 2 Ancient Maya statue of a woman seated in a backstrap loom. This statue is a ceramic from Jaina, Campeche, A.D. 700–900. Photo courtesy of the Instituto Nacional de Antropologia e Historia, Mexico City.

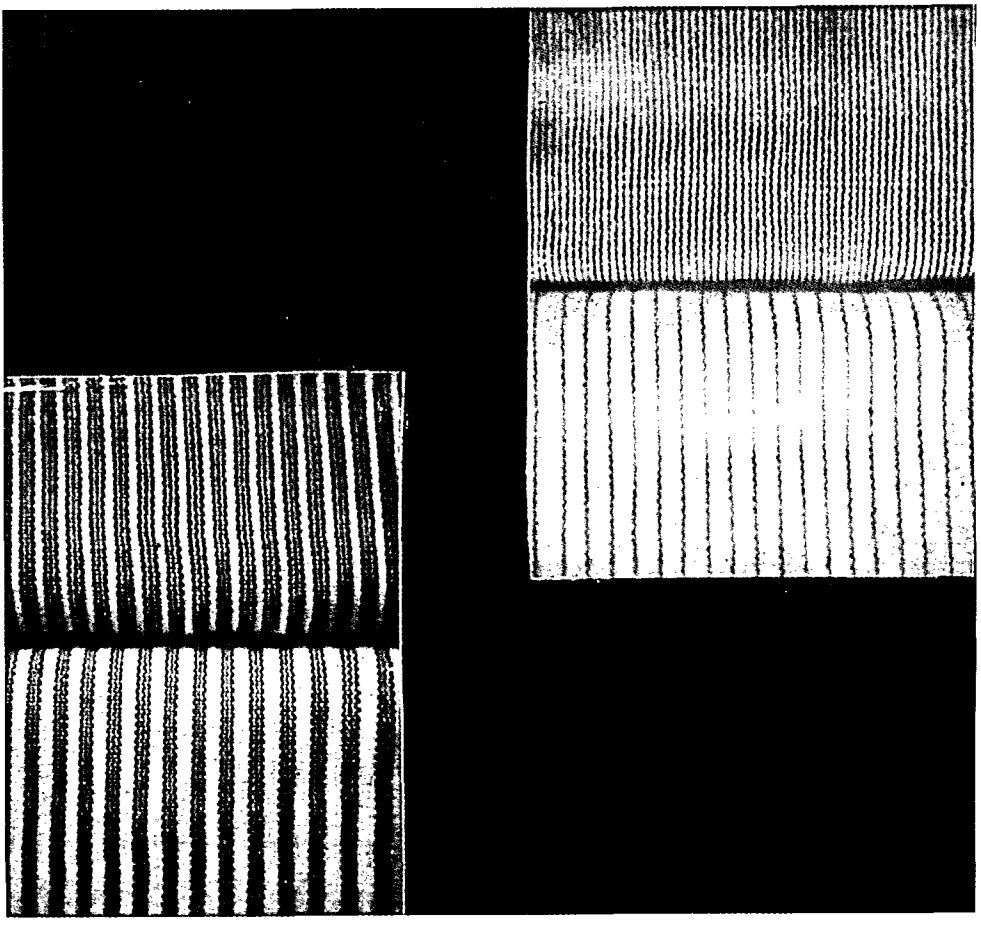

FIGURE 3 Two red-and-white striped woven patterns, Nabenchauk, 1969. Top right pair is two variants of a pattern for a poncho worn by males. Bottom left pair is two variants of a pattern for a shawl worn by females. Photo courtesy of Carla Childs.

as we found in 1970, on the one hand, versus relatively independent trial-and-error learning on the other. Whereas the first is adapted to the transmission of tradition, and was what we found in 1970, the second, with its emphasis on the learner's own discovery process, is adapted to the development of skill in innovation, and was expected in 1991. If innovation had entered the culture as a value orientation in response to entrepreneurship, I thought that weaving education would make a corresponding shift away from scaffolding (or developmentally sensitive guidance) to a more discovery-oriented and independent trial-and-error process.

A second prediction was that weaving artifacts would no longer be limited to a small stock of patterns; instead weavers would constantly innovate new patterns. Innovative pattern representation was conceived of as a major change in the cognitive processes associated with weaving.

FIGURE 4 Little girl's blouse pattern, 1969. Photo courtesy of Lauren Greenfield.

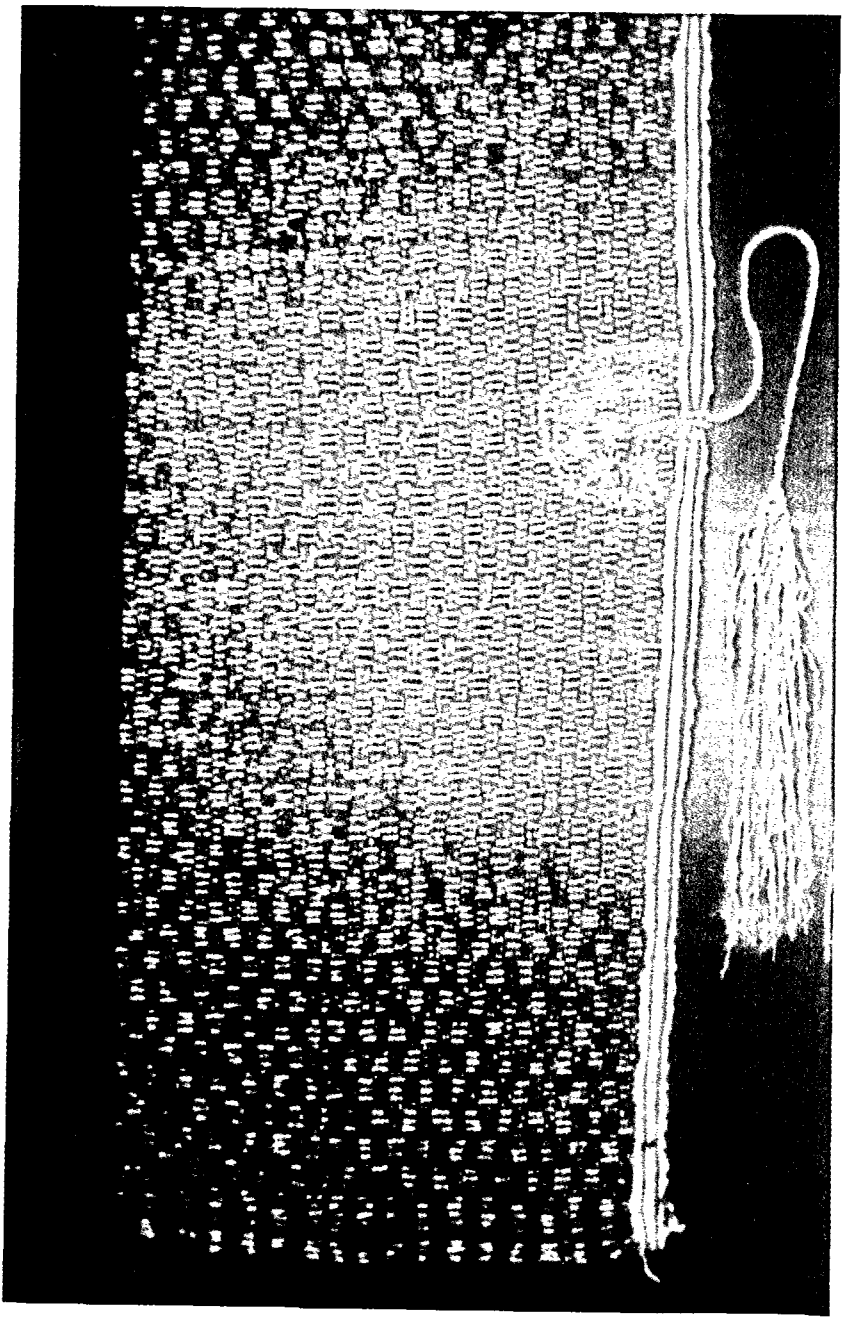

FIGURE 5 Basketweave pattern for a shawl.

Both these hypotheses were formulated on the basis of theory alone (Greenfield & Lave, 1982). I had not been back to Zinacantan in 21 years. I went back in 1991 to test these predictions with Carla Childs.

HYPOTHESIS 1: HISTORICAL CHANGE IN WEAVING APPRENTICESHIP

We thought that the old method of observation of models, in conjunction with receiving developmentally sensitive help, would change. Earlier the teacher had carefully built a scaffold of help for the learner, providing help before the learner had an opportunity to make a serious error (Childs & Greenfield, 1980; Greenfield, 1984; Greenfield et al., 1989; Greenfield & Childs, 1991). Because the learner, in this situation, received very little opportunity to make a mistake, let alone to explore, *we predicted that the methods of teaching and learning would have changed to a more independent trial-and-error approach.*

In order to test this hypothesis, we went back to study the daughters of our 1970 weaving subjects. We had 14 in our original sample, one of whom, Katal 1[1], is shown in Figure 1. Between 1970 and 1991, Katal grew up and had five daughters of her own. Four were old enough to weave and became subjects in our historical replication 21 years later. In all, we succeeded in locating 14 daughters (of seven mothers) who were old enough to weave for our study, some for the very first time. Once again, we videotaped the apprenticeship process.

In addition, we expanded our sample of weaving learners to 58, so that we would be able to statistically examine the effects of various factors, such as attending school or selling weaving, on the methods of informal education. The additional weaving learners were from the same group of extended families from which the original 14 learners had been drawn in 1970; many were nieces or godchildren of the 1970 sample of weaving learners. For this article, I focus on well-controlled historical comparisons from the two epochs. The qualitative findings presented here have been confirmed by quantitative analysis of the entire sample (Greenfield, Maynard, & Childs, 1997).

The video frame of Katal learning to weave shown in Figure 6 symbolizes weaving apprenticeship, circa 1970. She was 9-years-old at the time of the study; her mother served as her weaving teacher.

As illustrated in Figure 6, Katal's mother was continuously there, helping and guiding her. Her mother was so involved that, often, there were, as in Figure 6, four hands on the loom.

This scene from Katal's weaving apprenticeship in 1970 is very different from the way Katal's daughters were learning to weave in 1991. Learning to weave is a developmental process. Therefore, for comparative purposes, I have selected a daughter who was exactly the same age in 1991 as Katal had been in 1970. Figure 7 shows a frame from Katal's daughter, Loxa 1-201, age 9, learning to weave in 1991.

The first major difference to note is that Katal, the mother, is not even present. Katal had assigned an older daughter, Xunka, age 12 or 13, to serve as the teacher. This change from older-generation to peer-generation teachers and helpers was one of our more general findings (Greenfield et al., 1997).

[1]Numbers following names in the text refer to family numbers in our database.

FIGURE 6 Mother helping Katal 1, age 9, with her weaving (video frame). Nabenchauk, 1970.

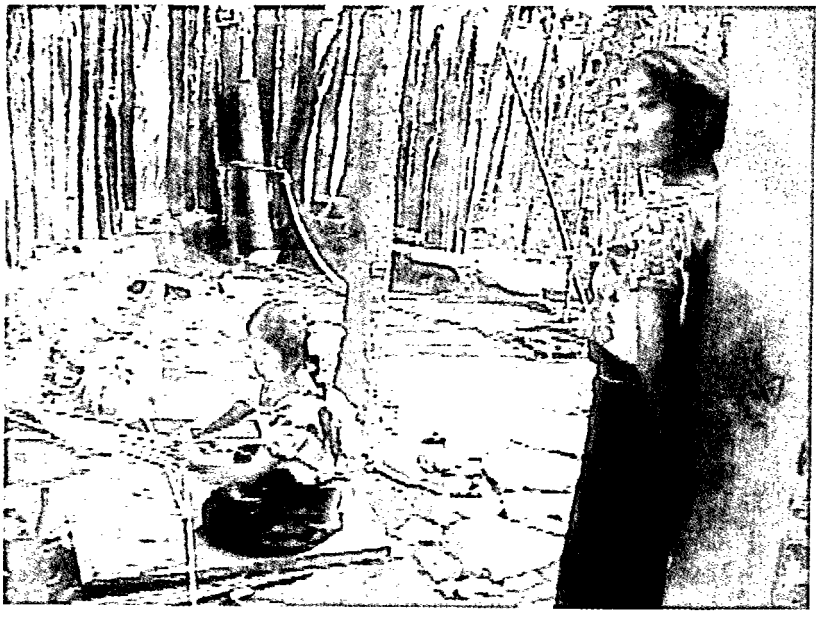

FIGURE 7 Weaving learner (Loxa 1-201, age 9) and teacher (older sister, age 12 or 13; video frame). Loxa is the daughter of Katal 1, shown learning to weave in Figure 6.

Katal, the mother, was at home, but chose not to be part of the weaving session. In point of fact, she was embroidering a blouse to sell on order. This situation illustrates a direct connection between the mother's commercial involvement and changes in the apprenticeship process. Indeed, our quantitative analysis confirms that commercial involvement of mother and daughter is causally linked to a change in the relationship of the weaving teacher from older generation to peer generation (Greenfield et al., 1997).

Second, and most important, in Figure 7 the older sister is not paying visual attention to her younger sister, the weaving learner—this despite the fact that the younger sister is, in fact, a novice. Indeed, in one scene, Loxa had to call the teacher twice to get her attention.

The teacher's behavior is in sharp contrast to that of their grandmother in Figure 6. Figure 6 shows a typical scene from 1970: The teacher/mother was in constant visual contact with her daughter's weaving activity and therefore consistently anticipating her need for help. Teacher, rather than learner, took the initiative when help was required. The generality of this change was also confirmed by our quantitative analysis (Greenfield et al., 1997).

In sum, the 1991 weaving learner, as illustrated in the comparison of Figure 6 and Figure 7, had become much more independent. The movement from interdependence to independence (Greenfield, 1994; Markus & Kitayama, 1991) is also illustrated by the greater physical distance between learner and teacher in 1991 (Figure 7), compared with 1970 (Figure 6).

This generational contrast in teaching styles is all the more amazing, given the fact that we generally learn how to teach from the way our mothers taught us (C. Childs, personal communication). In addition, compared with her sisters, Katal is temperamentally most like her mother (Loxa's grandmother), so, on the basis of both her mother's genes and her mother as model, one would have expected Katal to have followed her mother's teaching style with her own daughters. The fact that she did not is a powerful example of adapting teaching to changed conditions in the space of a single generation.

I now present a different 1970 weaving subject for another controlled comparison. For this comparison, I selected the one family (146) in which there were two weaving subjects in 1970 the same age as Loxa and her sister Xunka (approximately age 9 and 13). Given this identical configuration of siblings, would the role of mother and older sister have changed in the intervening 21 years? One would predict from the theoretical model that mother and elder daughter would be more involved in guiding and helping the learner. This is precisely what I found. Figure 8 shows a frame from the video of Katal 146.

Note that the mother is close at hand; analysis of the action and interaction of the video showed that she was helping (e.g., making a measuring stick to be used in the weaving process) and advising the older daughter on how to help the learner. There was a hierarchy of control from eldest (mother) to next eldest (older sister) to youngest (learner). Both mother and the older daughter were very attentive to the learner's needs and were constantly involved in the learner's weaving.

This is a very different scene from that shown in Figure 7, 21 years later with the same configuration of gender, age, and family relationships. In Figure 7, the older sister is uninvolved, physically distant from the learner, and inattentive to her needs. The 1991 mother uses the older sister as a *substitute* for herself as teacher; in contrast, the 1970 mother uses the older sister as an *adjunct* (Figure 8). Rather than a three-level hierarchy of control from eldest to youngest, both sisters (teacher and learner) in the 1991 scene are operating quite independently of the authority of the older generation.

In 1970, the flow of authority from elder to younger was a central value in Zinacantec society (Vogt, 1969). By 1991, this age-graded hierarchy was disappearing in many areas of life (Collier,

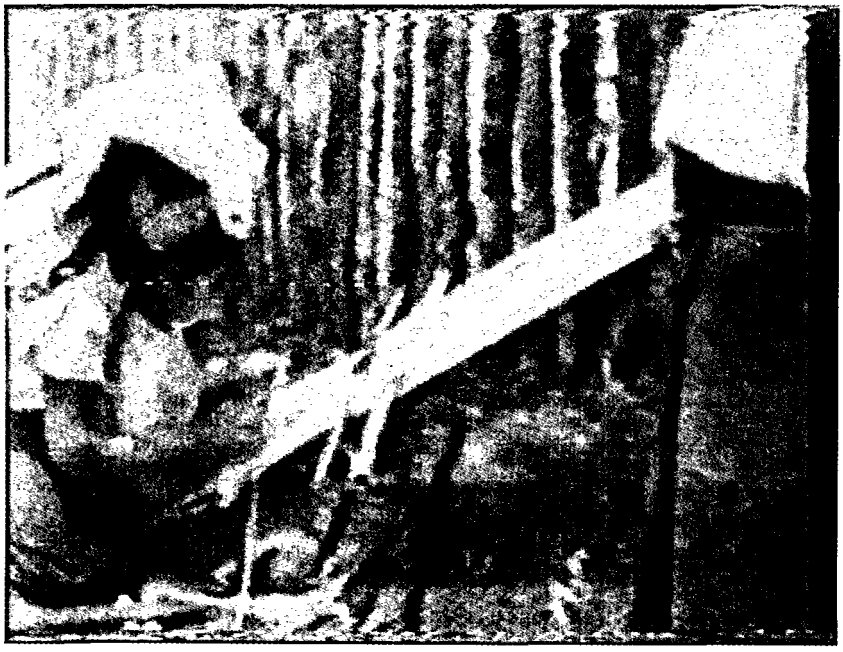

FIGURE 8 Katal 146, age 9, learning to weave with the aid of her mother, right, and older sister, age 13, left (video frame).

1990). Indeed, it was disappearing in the basic economic system, where dependence on the land held by the older generation was being replaced by independent entrepreneurship (Collier, 1990). The movement away from an age-graded flow of authority was quite dramatic in weaving, where older women do not even know all of the new techniques mastered by their daughters.

In sum, we found more independent learning in 1991 than in 1970, whether we compare Loxa, our 1991 learner, with the way her mother learned to weave in 1970, or we compare her with another 1970 weaver matched for the family configuration of people on the scene. These examples support Hypothesis 1: Between 1970 and 1991, the weaving novice became more independent, with less guidance and modeling from the master.

According to my model, independent trial-and-error learning should be associated with pattern innovation. One reason is that, if you are experimenting independently, you might create or discover something new. I now turn to what we found in the domain of woven textiles when we returned in 1991.

HYPOTHESIS 2: HISTORICAL CHANGE IN WOVEN TEXTILES

In the domain of woven textiles, I predicted that patterns would no longer be limited to three stripes and a basketweave (Figures 3, 4, and 5); instead, there would be an ongoing process of pattern innovation and creation. The extent to which this historical hypothesis was confirmed was indeed quite

astonishing. I will use changes in the men's poncho to illustrate the growth of innovation and creativity in the domain of woven textiles.

Figure 9 shows the old-style men's poncho, made from a uniform striped material (top of Figure 3).

The two brothers in the photo are dressed alike, as would be all other Zinacantec men and boys of the epoch.

When we returned in 1991, a fancy brocaded border had been added to the poncho. No two were alike. Figures 10 a, b, and c show three variants of the figurative and geometric designs that were being woven through a brocading process (shown in Figure 10c) for poncho borders.

Furthermore, entrepreneurship and commerce were not limited to transport; they had hit weaving as well. Figure 11 shows girls embroidering as they attend to a weaving stand on the road at the edge of their village.

They are selling a new commercial item seen hanging in the background; it is called the *servilleta* (napkin, towel) and has been designed and made for outsiders to buy.

In sum, Hypothesis 2 was confirmed also: In 1991 we found constant pattern innovation. This innovation includes the creation of new motifs, the recombination of existing motifs, and the development of new tourist items.

FIGURE 9 Two Zinacantec brothers, Marian 1 (left) and Antun 1 (right) dressed in ponchos utilizing the woven stripe shown at the top of Figure 3 that was standard in 1969 and 1970. Nabenchauk, 1970. Photo courtesy of Sheldon Greenfield.

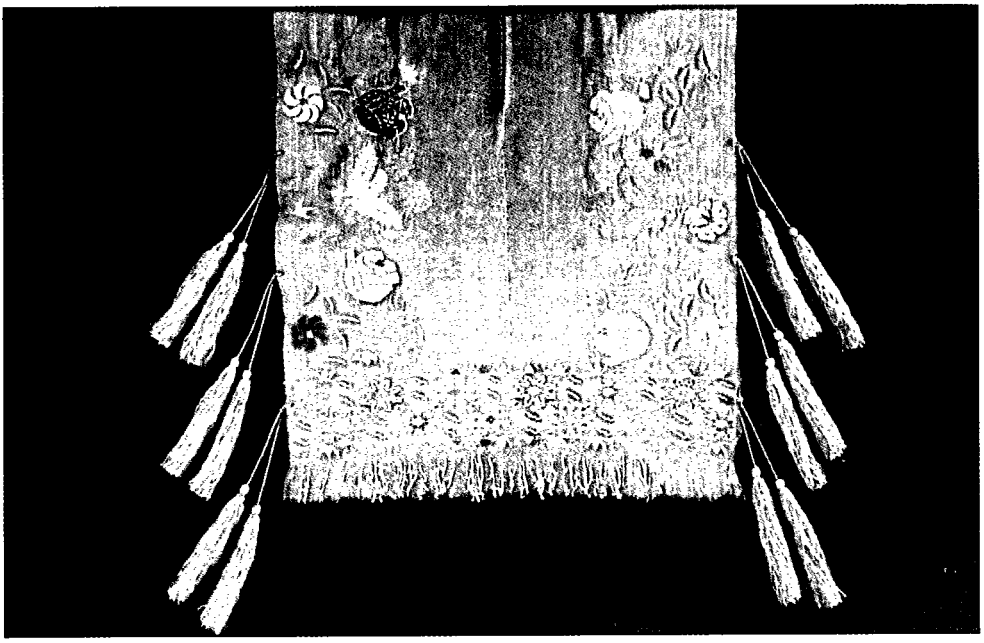

FIGURE 10a Variant of an infinite number of designs for the Zinacantec male poncho, Nabenchauk, 1991. Photo courtesy of Lauren Greenfield.

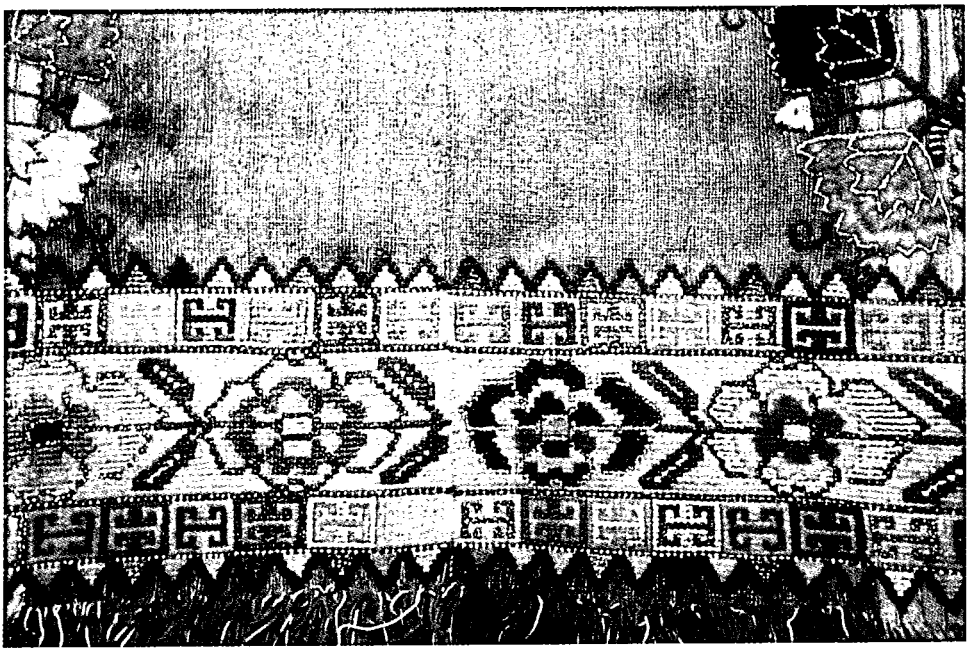

FIGURE 10b Variant of an infinite number of designs for the Zinacantec male poncho, Nabenchauk, 1991. Photo courtesy of Lauren Greenfield.

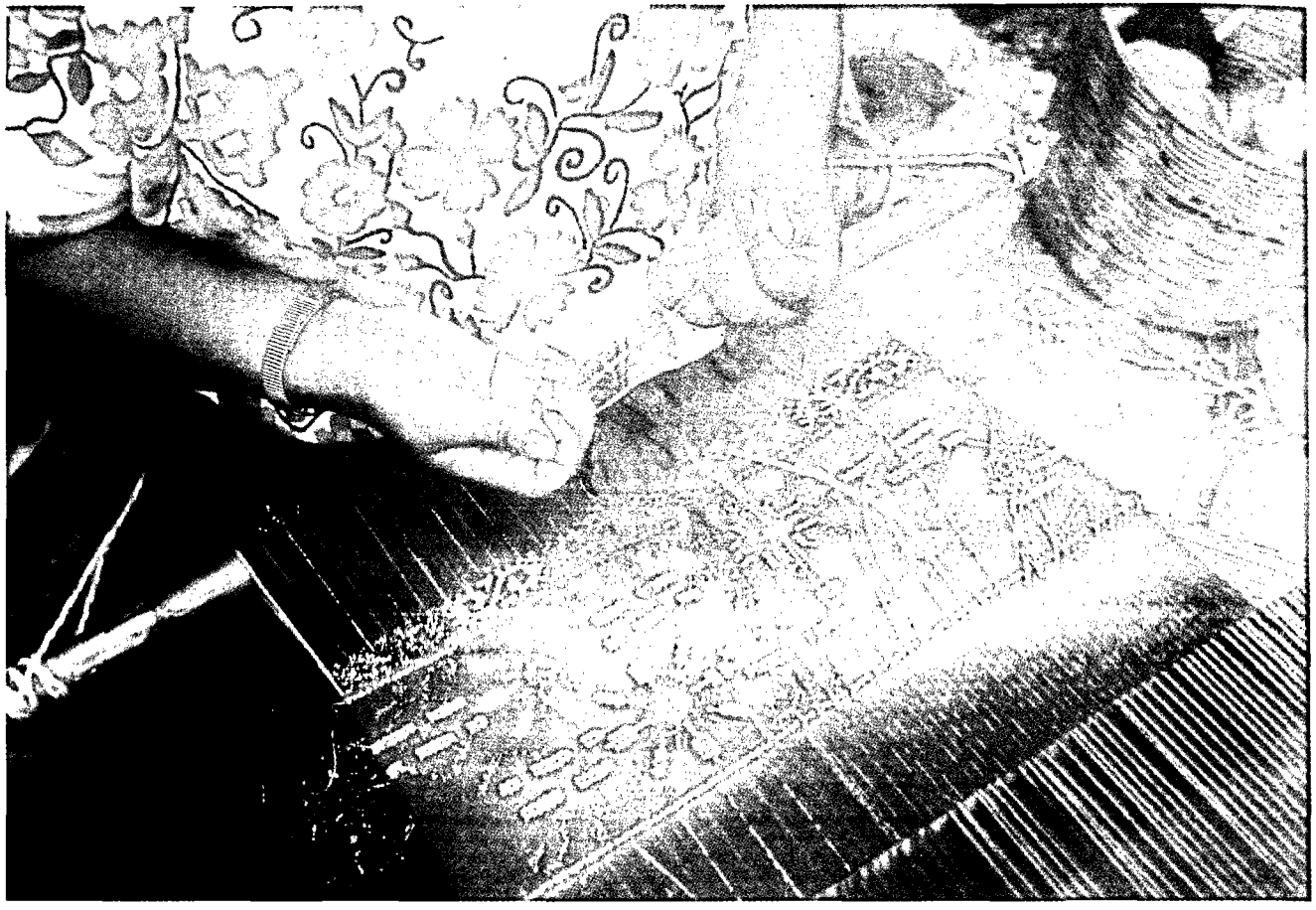

FIGURE 10c Variant of an infinite number of designs for the Zinacantec male poncho, Nabenchauk, 1991. This figure shows the brocade border as it is being woven. Photo courtesy of Lauren Greenfield.

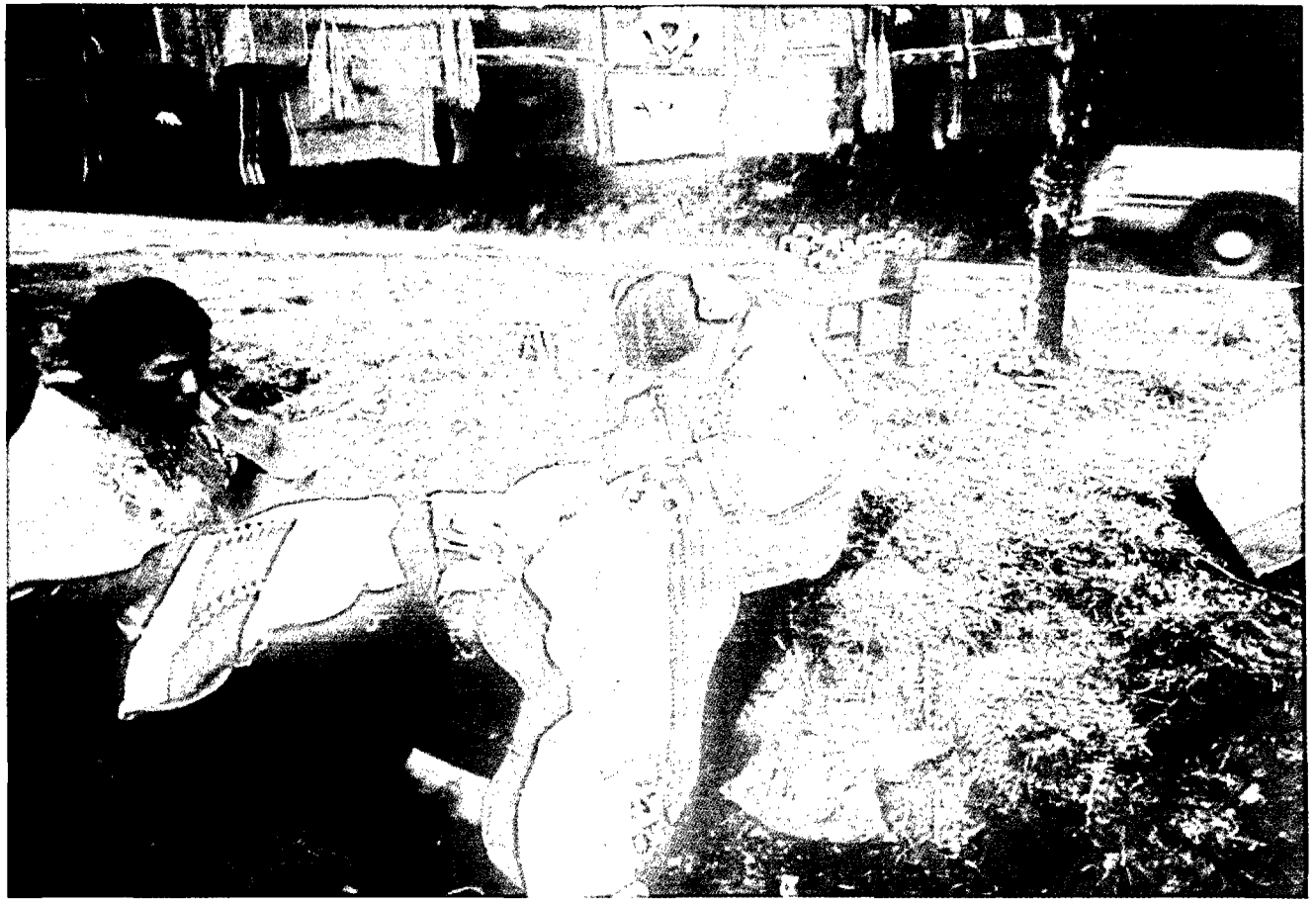

FIGURE 11 Girls embroidering as they sell woven and embroidered *servilletas* (towels) on the Pan American Highway at the edge of Nabenchauk, 1991. Photo courtesy of Lauren Greenfield.

CONCLUSION

In conclusion, the teaching of weaving has turned out to be remarkably responsive to societal changes, notably the movement from agricultural subsistence to an entrepreneurial cash economy. As predicted, we found a definite movement from highly scaffolded relatively errorless learning, involving a great deal of observation of models (1970), toward a much more independent sort of trial-and-error learning (1991). We reached these conclusions by following families over two generations of weaving apprenticeship.

At the same time, and also as predicted, the stock of four rather carefully defined striped and basketweave patterns grew to an infinite number of complex figurative and geometric patterns, with motifs that are constantly changing and being recombined in new ways. Independent trial-and-error learning was, indeed, associated with pattern innovation, as the theoretical model predicted.

This example of weaving instruction indicates that the process of socialization prepares the next generation to participate in society, even under conditions of societal change. Even in Zinacantan, a society that in 1970 was based on respect for tradition, we see that changing socialization patterns are indeed a very real component of the psychological adaptation to social change. For the first time, we have direct longitudinal empirical historical evidence on this issue in the psychology of teaching and learning.

We have found that parents do not merely recreate the socializing process that they underwent as children. There is a tremendous capacity to develop new methods of cultural apprenticeship as societal conditions, in this case, economic conditions, change. These new methods entail changes in human relations, as well as changes in cultural artifacts. Changes in the creation of cultural artifacts (here, woven textiles) imply cognitive consequences in creativity and visual representation.

More broadly, our study of three generations of Zinacantec weavers—grandmothers, mothers, and daughters—exemplifies learning and teaching as key components of the human capacity to adapt to a changing environment.

ACKNOWLEDGMENTS

This article was originally presented at two symposia in memory of Sylvia Scribner, one at the Society for Research in Child Development, New Orleans, March 1993, the other at the International Society for the Study of Behavioral Development, Recife, Brazil, July 1993.

The research on which this article is based was supported by the Spencer Foudation; National Geographic Society, UCLA Latin American Center; Wenner-Gren Foundation for Anthropological Research; National Institutes of Health Fogarty International Center, Minority International Research Training Program; Colegio de la Frontera Sur; UCLA Academic Senate; Harvard Center for Cognitive Studies; the Bunting Institute of Radcliffe College; and the Milton Fund of Harvard Medical School. I thank our friends and study participants in Nabenchauk, Zinacantan.

This article is dedicated to the memory of Sylvia Scribner. An inspiring and supportive colleague, she highlighted Vygotsky's uses of history in a pathbreaking article (Scribner, 1985).

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