

Cultural variation in children's observation during a demonstration

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Ethnographic research indicates that in a number of cultural communities, children's learning is organised around observation of ongoing activities, contrasting with heavy use of explanation in formal schooling. The present research examined the extent to which first- to third-grade children observed an adult's demonstration of how to fold origami figures or observed the folding of two slightly older children who also were trying to make the figures, without requesting further information. In the primary analysis, 10 Mexican heritage US children observed without requesting additional information to a greater extent than 10 European heritage US children. Consistent with the ethnographic literature, these two groups differed in the extent of their family's involvement in schooling; hence, we explored the relationship with maternal schooling in a secondary analysis. An additional 11 children of Mexican heritage whose mothers had extensive experience in formal school (at least a high school education) showed a pattern more like that of the European heritage children, whose mothers likewise had extensive experience in school, compared with the Mexican heritage children whose mothers had only basic schooling (an average of 7.7 grades). The results suggest that a constellation of cultural traditions that organise children's learning experiences—including Western schooling—may play an important role in children's learning through observation and explanation.

Introduction

This study investigated cultural variation in children's observation during a paper-folding demonstration that was designed to require observation. We examined the extent to which young US children of European and Mexican heritage observed the demonstrating adult and two accompanying slightly older children, without their attempting to obtain further information beyond what was available in the demonstration.

Although children's learning through observation is of obvious importance to child development everywhere, ethnographic accounts suggest that in some communities keen observation plays an even more important role than in others. In many communities, children have extensive opportunities to learn as onlookers in "legitimate peripheral participation" (Fortes, 1970; Lave & Wenger, 1991; Morelli, Rogoff, & Angelillo, 2003). For example, Mazahua (indigenous Mexican) parents expected their 9-year-old children to take the initiative to learn by watching while participating in a shared

task; if the children did not observe, parents reminded them of their responsibility to watch (De Haan, 2001). Yucatecan Mayan 2- to 3-year-olds spent a great deal of time silently observing the ongoing activities of the extended household; they could give an accurate account of the whereabouts and activity of each member of the household (Gaskins, 1999).

Ethnographic accounts suggesting that indigenous children employ keen observation to a remarkable extent imply a contrast with industrialised Western communities, but systematic comparisons between such communities are rare. One comparative study found that young rural Senegalese children observed other people more than twice as often as middle-class European American children did (Bloch, 1989). Other comparative studies found that Guatemalan Mayan mothers and toddlers attended simultaneously to several ongoing events more than their middle-class European American counterparts, a difference that the authors related to community emphasis on learning through observation (Chavajay & Rogoff, 1999; Rogoff, Mistry, Göncü, & Mosier, 1993). The present study systematically compared children's use of studious

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observation without requests for information beyond that available through a demonstration, in a comparable situation in several cultural communities that differ in their traditions of learning.

Traditions of learning: "Intent participation" and didactic explanation

Based on the ethnographic literature and the few comparative studies, Rogoff, Paradise, Mejía Arauz, Correa-Chávez, and Angelillo (2003; also Rogoff, 2003) suggested that keen observation is part of a cultural tradition they referred to as *intent participation*. In this tradition, children observe ongoing events keenly in the process of or anticipating involvement in family and community activities, and begin to participate as they become ready (Philips, 1983; Rogoff, 1981, 2003; Ward, 1971; Watson-Gegeo & Gegeo, 1989). For example,

Navajos do not teach their children, but they incorporate them in every life task, so that children learn themselves, by keen observation. Mothers do not teach their daughters to weave, but one day a girl may say, "I am ready. Let me weave." (Collier, 1988, p. 262)

Intent participation appears to be a prominent way of organising children's learning in indigenous American communities (among some other communities with non-Western roots).

In contrast, historical changes connected with industrialisation, child labour laws, and compulsory schooling have contributed to segregating middle-class children from many mature settings, limiting their opportunities to learn through observing and pitching in to the full range of their communities' activities (Morelli et al., 2003). Instead, learning by means of adults' explanations may be especially familiar to children in middle-class families, where parents as well as teachers frequently provide lessons (Heath, 1983; Martini, 1996; Morelli et al., 2003; Rogoff et al., 1993; Schieffelin & Ochs, 1986). The lessons frequently employ explanations out of the context of ongoing productive activities, often substituting explanation for observation and participation (Cazden & John, 1971; Heath & Branscombe, 1986; Rogoff, 1990, 2003; Rogoff et al., 2003; Scribner & Cole, 1973).

Familiarity with learning through explanation rather than observation is reflected in a middle-class white Canadian child's experience in an Inuit community in Northern Quebec, where children take the initiative to reason about what they carefully observe, rather than being told (Briggs, 1991):

One day when my eight-year-old daughter was watching some girls her age play a game in the house where we were staying, she turned to the [Inuk] mother who spoke English and said:

Anna: How do I play this game? Tell me what to do. What are the rules?

Inuk Mother: (gently) Watch them and you'll see how it goes.

Anna: I don't know how to learn by watching, can't you tell me?

Inuk Mother: You'll be able to know by watching. (Crago, 1988, p. 211)

In communities emphasising observation, the emphasis is on children's initiative in observing and figuring out how to pitch in; some explanation may occur in the process of ongoing

activity or explanation may be downplayed altogether. For example, Kaluli (New Guinea) mothers encourage toddlers to observe ongoing events and tell children "Do like that", as they demarcate components of a task without explaining them; the children observe closely and pitch in to help (Schieffelin, 1991). If Rotuman (Polynesian) children ask for explanation, "they are likely to be told to watch a skilful adult in action" (Howard, 1970, p. 116). In a Mayan community, adults expect children to be alert to ongoing activities in order to learn and to observe carefully before explanations are given (Chavajay, 1993).

This study investigates whether learning by observing without requesting further information is more common among children whose community heritage resembles that of the ethnographic studies in indigenous American communities—where learning by intent participation in community activities seems to be emphasised—than among children whose community heritage stresses involvement in lesson formats.

The present study: Primary analysis

Our primary analysis compares the approaches of European heritage children whose mothers have extensive experience of schooling and Mexican heritage children whose mothers have only basic schooling, because these backgrounds are closely related to those of the communities that have prompted suggestions of cultural differences in observation.

An emphasis on observation may be common in communities with MesoAmerican indigenous background and little history of schooling, such as people emigrating from rural areas in México to the central coast of California, where our study occurred. Several studies in México emphasise learning through observation (Cancian, 1964; Maurer, 1977; Modiano, 1973; Paradise, 1994; Whiting & Edwards, 1988; Whiting & Whiting, 1975), as in indigenous Guatemalan Mayan communities (Chavajay & Rogoff, 1999; Reina, 1966; Rogoff et al., 1993). Consistent with the ethnographic work in México, some studies have found that Chicano mothers in the US tended to instruct children by using modelling more than Anglo-American mothers, who tended to use more questions and praise (Laosa, 1980b; see also Laosa, 1980a; 1982; Steward & Steward, 1973, 1974).

The Mexican heritage US children in our study are not assumed to represent US Mexican heritage children generally, nor are the European heritage US children assumed to represent all US European heritage children. The focus is on characterising patterns of *cultural practices* that vary in specific communities, not on characterising populations. If the expected patterns are found, further research in a number of related communities would be required to examine applicability of the findings to other communities. Indeed, the impetus for this study was to extend prior research on children's observation done in indigenous communities in Central America and México to people who have a historical relation to such communities but have lived in the US recently. The findings of our primary analysis may or may not extend to Mexican heritage families that have been in the US for many generations, emigrants from large Mexican cities rather than rural México, or people who have participated extensively in practices stemming from other communities—such as schooling.

Secondary analysis: The children's mothers' experience with schooling

Mexican heritage children with mothers who have extensive experience with schooling were also included for an exploratory analysis of the connection of mothers' formal schooling with Mexican children's use of observation. Formal schooling has in the past century spread around the world from its European and North American origins, and this may bring far-reaching consequences for approaches to learning (LeVine & White, 1986; Meyer, Ramirez, & Soysal, 1992; Rogoff, 2003; Scribner & Cole, 1973). Mothers' experience with Western schooling in several nations has been shown to relate closely to differences in the ways they interact with their children—with greater use of praise, language lessons, and assignment of division of labour (e.g., Chavajay & Rogoff, 2002; LeVine, LeVine, Richman, Tapia Uribe, & Miller, 1991; Rabain-Jamin, 1989; Richman, Miller, & LeVine, 1992; Rogoff et al., 1993). For example, differences between Anglo-American and Chicano mothers' approaches to instruction (use of modelling versus questions and praise) were minimised when maternal schooling was held constant (Laosa, 1978, 1980b, 1982; see also Moreno, 2000).

We thus included a secondary analysis to examine whether Mexican heritage children whose mothers had completed high school more closely resembled (a) Mexican heritage children whose mothers had less schooling experience or (b) European heritage children whose mothers also had extensive schooling. Such an analysis may be helpful as a preliminary exploration of the idea that family use of traditional indigenous approaches to learning may be replaced through extensive school experience. Of course, our study can only examine the connection, not causation, between maternal school experience and the Mexican children's observation.

We did not examine levels of maternal schooling for European heritage children because wide variability in the extent of maternal schooling did not exist—all the mothers of the available children had been through high school—and because limited schooling is likely to have different meaning across communities. Less experience with schooling in a Mexican heritage community is not simply an absence of this experience but also may involve greater experience with traditional informal means of learning that emphasise observation of ongoing activities. In contrast, there appears to be no basis to assume that European heritage mothers who have little experience in school are likely to have greater experience with forms of learning that prioritise observation. Thus, we are not treating extent of experience in school as a variable independent of the ethnic heritage of the children. We see mothers' experience within the cultural institution of schooling as an aspect of cultural practice that may compete *in some communities* with mothers' experience in traditional community-based informal forms of learning that prioritise observation.

We are not attempting to isolate schooling as an independent, causal variable. Rather, we interpret maternal schooling and family ethnicity as important features of a constellation of related aspects of community lives, connecting with other differences between communities such as income and occupational differences, family size, and dozens of other features of families' lives (Rogoff & Angelillo, 2002).

In sum, in our primary analysis, we expected that Mexican heritage children whose mothers had basic schooling would

more often observe an adult's origami demonstration—and their peers' folding—without seeking extra information beyond that available from watching. We expected that European heritage children (whose mothers had many years of experience in school) would try more often to elicit additional information, based on the idea that they may be more used to obtaining information through explanations than through studious observation. In our secondary analysis, we examined whether Mexican heritage children whose mothers had many years of experience with the Western cultural institution of school would more closely resemble the children of their own ethnic heritage or the children whose mothers had similarly extensive participation in schooling, in the extent to which they make use of observational strategies for learning.

Method

The scenario was a scripted origami demonstration by a bilingual adult to triads of 6- to 10-year-olds, seated around a table in a comfortable room in the children's school. Within each triad, our focus was on the youngest child's observation without requests for information beyond that available from the demonstration and the older children's folding.

We analysed the youngest children because usually they have more reason to observe older children's folds in order to figure out what to do than vice versa, especially among the Mexican heritage children, where young children's caregivers are often slightly older children. Greater observation by younger children has been observed in other studies (Butler, 1989; Chavajay & Rogoff, 2002; Cooper, Marquis, & Edward, 1986). In the present study, in Mexican heritage triads with maternal basic schooling, the youngest children were more likely to observe another child without making requests for further information, doing so in an average of 6.9 folding segments ($SD = 2.7$), compared with the middle and oldest children, who did so in an average of 5.4 and 4.9 segments ($SDs = 2.9$ and 1.7), $t(18) = 1.98$, $p < .05$. In the other two backgrounds, differences between youngest and older children did not approach significance.

Each child made two figures during the demonstration (which averaged 13 minutes). The pig puppet and jumping frog figures were unfamiliar and of great interest, according to the children. Piloting ensured that the procedure aided the children in making the paper figures with challenges but not frustration. A few more children in the two backgrounds with maternal high schooling reported slight experience with origami (about half of the youngest children in each of these backgrounds versus 10% in the other background). However, the extent of experience was small; background differences in familiarity were not significant and did not correlate with the children's observation and requests for more information¹.

¹ Experience with origami did not correlate with the children's observations and requests, except that the youngest children who had some experience with origami made more verbal requests, $r = .34$, $p = .04$, a relationship that is probably secondary to the differences that we report in the results.

Table 1
Youngest child's characteristics (mean and range)

	<i>European heritage with maternal high schooling n = 10</i>	<i>Mexican heritage with maternal basic schooling n = 10</i>	<i>Mexican heritage with maternal high schooling n = 11</i>
Children's age	7y 6m (6y 5m to 8y 11m)	7y 2m (6y 5m to 8y 1m)	7y 6m (6y 2m to 8y 7m)
Number of siblings	1.1 (range 0-3)	2.1 (range 0-4)	1.4 (range 1-2)
Number of triads with all girls/all boys	6/4	5/5	7/4

Participants and their communities

Thirty-one children aged 6 to 8 years (mean = 7 years 5 months) took part in the origami demonstration in triads with two slightly older children (mean age = 8 years 8 months). Triads were employed to provide potential distraction as well as ample opportunity to observe other children. The triads were composed of same-gender children from 1st and 2nd or 2nd and 3rd grades. Table 1 summarises the youngest children's ages, number of siblings, and gender. Permission for the children to participate was given by 69% of the parents in 11 classrooms.

The children came from two similar schools in a coastal California agricultural town that has many immigrants from rural Mexican areas of Jalisco and Michoacán. Almost all the Mexican heritage children were US-born children of immigrants (according to school records). The mothers with basic schooling are likely to be the first generation to attend school; Los Angeles parents who immigrated from the same regions averaged 7 years of schooling, and the grandparent generation averaged only 0.6 years (Reese, 2002; see also Valdés, 1996).

The European heritage children were all born in the US, where high levels of schooling have been common for generations for European Americans. By 1993, only 8% of white adults in families in the middle 60% of income had not completed high school; at least 80% of the children's grandparents are likely to have completed high school, along with more than half of their great-grandparents (Bronfenbrenner, McClelland, Wethington, Moen, & Ceci, 1996).

Triads were formed of the same ethnic and maternal schooling background, because we expected that children would be influenced by their companions' backgrounds. Ten triads contained European heritage children, all of whom came from families in which the mothers had at least a high school education (averaging 14.8 grades, range 12-17). Ten triads were composed of Mexican heritage children with maternal basic schooling (less than high school; average 7.7 grades, range 3-10). Eleven triads were composed of Mexican heritage children with maternal high schooling (average 12.6 grades, range 12-17).

Dividing maternal schooling into two levels was necessary to form triads of Mexican-heritage children with similar maternal schooling. The boundary was set at high school completion because this is an important milestone that produces a real distinction for employment, and it was near the median for the Mexican heritage families. Extent of schooling was distributed in two patterns for the available Mexican heritage mothers:

those who had completed high school and those with basic schooling, ranging from third through tenth grades, with an average of 7.7 grades completed.²

Procedure

An "Origami Lady", who was unaware of the questions of the study, demonstrated folding in a standardised script that ensured that the children would have to observe carefully and allowed us to compare observation in similar circumstances in the different backgrounds. Naturally occurring adult-child interaction would likely not have provided a similar frequency of events calling for observation, without adult management of children's attention. So that the children could not make the figures without watching, our script avoided explicit complete verbal directions, such as "take the corner nearest you up to the point farthest from you and fold the shape into a triangle". It did include less explicit comments accompanying the demonstration, such as "now like this" and "now we open it and fold it again".

The script directed the Origami Lady to play the role of a friendly adult (an "auntie"), willing to show the children how to fold paper figures. It avoided the role of a teacher directing children's learning, to provide the children freedom to manage their own attention (or not). The script specified that the Origami Lady should not try to manage the children's attentiveness and that she should move to the next fold when the children had completed the current fold without obvious checking of correctness.

The Origami Lady was a bilingual first-grade teacher in one of the schools. (Children in her class did not participate.) Of European American background herself, she was selected for her skill in interacting with both Spanish-speaking and English-speaking children (as reported by the principal) and because she participates warmly and comfortably in family events of both Mexican heritage and European heritage students.

When the first author—a bilingual Mexican citizen—accompanied the three children from their classrooms to a spare room for the session, she noticed what language they

² There are likely to be important distinctions at earlier points than high school completion in countries like México, where sizeable portions of the population complete their schooling at either the end of elementary school (6th grade) or *secundaria* (9th grade; Reese, 2002). However, the sample size available to us did not provide sufficient numbers to subdivide at these interesting earlier points.



Figure 1. The Origami Lady demonstrates the folding of a figure to three children.

used comfortably. She then cued the Origami Lady to use that language or combination,³ and remained in the room operating the videocamera. The children were thus in the company of two bilingual adults, one Mexican and one European American.

We set up the room to be casual and comfortable, with colourful posters, cushions, and toys. The children chose where to sit at a rectangular table with three empty chairs at the end of the table and across from the Origami Lady (see Figure 1). The youngest child sat in each of the three positions about equally often, and was not singled out in any way in the procedure.

The session began with a 3 to 4-minute warm-up for the children to become comfortable in the setting and to show them that they could play and talk with each other. The warm-up involved chat and play among the children and the Origami Lady, including making animal noises with models of the pig puppet and making models of the frog jump. Then the Origami Lady asked the children if they would like to fold their own figures. (All children were very interested.) She invited them to choose their favourite colour paper, leaving the model pigs and frogs on the table for the children to see and play with during the session.

Early in the demonstration of each figure, the Origami Lady took a 1-minute break, asking the children to continue with the second of two symmetric folds while she took care of something beside her (which required her to turn away from them). As determined in piloting, this encouraged the children to treat the session casually and to interact with each other, and allowed the Origami Lady to loosen any reliance on her management of the children.

When children ran into difficulty, the Origami Lady gave them time to try fixing problems by themselves and encouraged them to help each other; if the children were stuck or on the edge of frustration, she assisted them. If needed, she subtly

fixed the children's folds so that they could continue folding and each would end up with a completed figure. These aspects of her interaction, among others, were closely scripted to provide similar involvement with all triads. A procedural check verified that she followed the script, providing similar conditions for all the triads.⁴

After finishing the pig puppets, the Origami Lady and the children played with them and then put them aside to make the frogs. When the children finished, they took their figures (which they knew that they would get to keep) to their classrooms.

Coding

The videotaped sessions were segmented according to the 16 steps for folding the figures. The pig involved 7 segments (folding the first diagonal, folding the second diagonal, the first fold for ears, the Origami Lady's break during the children's fold of the second ear, and so on), and the frog had 9 segments, again with a break. Within each segment, coders determined whether the children studiously observed the Origami Lady's or another child's folds and the extent to which they requested additional information beyond that available from watching others fold.

⁴ The Origami Lady used a very similar total time for the three backgrounds (averaging between 13m 28s and 13m 40s). In all triads, she conversed with the children casually until they seemed warmed up. There were not significant differences across groups in the length of the two breaks or in the number of times the Origami Lady requested children to help each other (in all but one group, she made the two scripted general requests to the children to help each other; in at least half of the triads in all three backgrounds, she made a third suggestion to help). There was no difference in the extent to which she kept models in front of the children (she did so for 80-100% of the triads in all three backgrounds), or made sure they oriented their paper right for the first figure (she did so in 90-100% of the sessions for the three backgrounds), or instructed them to crease the folds precisely (she did so three to four times in 80-100% of the triads, and only once in the other triads).

No significant differences occurred in extent of "teacher talk" such as praising the children or controlling misbehaviour, which were very rare in all three groups. The number of extra explanations the Origami Lady provided beyond the 26 brief descriptions of folds specified in the script did not differ significantly (she provided 0 to 2 extra explanations in 60-91% of the triads, and in the others did so 3 to 5 times, passing up many more opportunities for extra explanations). She almost never left out any of the 26 scripted explanations.

Her timing before proceeding to the next of the 16 folds also did not differ significantly across the three backgrounds. She was supposed to move on as soon as the last child of the triad finished the fold, without obviously checking the children's work, and she usually did so. Occasionally she moved on before the last child had finished (three to five times in 0-18% of the triads, and less often in the others). Occasionally she looked around and checked the children's work after the last child finished before moving on (three to six times in 20-27% of the triads, and less often in the others).

The extent of assistance folding was similar across the three backgrounds (averaging 5.1, 5.2, and 4.2 assists per triad, for the European heritage, Mexican heritage-basic-schooling, and Mexican heritage-high-schooling triads, respectively; not a significant difference). Although the Mexican heritage triads with maternal basic schooling received help in response to a request only an average of 2.0 times (compared with 3.4 and 3.0 times), this was balanced by receiving spontaneous assistance 3.4 times (compared with 1.7 and 1.0 times). This pattern is consistent with differences in the children's frequency of requesting help (see results). The Origami Lady held off helping children, whether they were requesting her help or not, unless they seemed to be having difficulty that they were unable to fix themselves; in such cases, the script directed her to subtly fix the child's figure so that they would not become too frustrated to continue. Most of her assistance involved simply fixing the figure, with all three backgrounds; the remainder was mostly demonstrating a fold. The extent of her help did not correlate with the children's observation or requests for further help. All in all the Origami Lady's treatment of the triads of all three background groups was similar.

³ All European heritage triads conversed in English; of Mexican heritage triads with maternal high schooling, 9 spoke English during the session and the other 2 spoke both English and Spanish; and of Mexican heritage triads with maternal basic schooling, 2 triads conversed in English, 3 in Spanish or mostly in Spanish, and 5 in both Spanish and English. The children who spoke primarily Spanish were being schooled in both Spanish and English, in bilingual classes.

Studiously observing folding. Studiously observing folding was coded only if it was very clear that the child was studying the folds, with either extended studying or multiple glances. We excluded occasions with just a single brief glance in order to limit observation to occasions in which coders could judge with certainty that studious observation had occurred. Although extended study and multiple glances were distinguished in our coding, they yielded the same pattern of findings and so were combined to yield studious observation. For each of the 16 segments, we separately coded whether the child studiously observed the Origami Lady's demonstration or another child folding their own figures.⁵

Studious observation was coded only once per segment, even if several bouts of observation occurred during a single segment. We were not interested in how long or how many times a child looked at a fold; effective observation could occur briefly or over a longer period, with concentrated gaze or multiple glances. It was our impression that the children differed in duration and number of glances in ways unrelated to the studiousness with which they approached observing the folding. Hence we focused on judging whether or not the child had studiously observed a particular fold, excluding a single cursory glance (a glance that was so brief that it was ambiguous with regard to whether the child was studying a fold). The coding involved a yes-no judgment for each of the 14 folds (plus Origami Lady's two breaks, for the observation of peers), yielding a maximum score of 14 for studiously observing the Origami Lady folding and 16 for studiously observing a peer folding.

Requesting information beyond the demonstration script. We examined whether the child requested extra information beyond what was provided by observing others folding, as a way of seeing differences in children's comfort with learning solely from the demonstration and observing other children folding. We distinguished requests for verification of a fold (e.g., "Like this?" or "Does it go all the way to the top?" or "So it's like a criss-cross?") and requests for assistance (e.g., "Can you do it for me?" or "How do you do it?" or "I don't get it!"). Requests for verification were a bit more frequent than requests for assistance. Because the patterns for requests for verification and for assistance were similar, they have been combined for the analyses into total requests for further information. Requests for further information were recorded each time they occurred, even during the same segment (except that we did not count when a child echoed their own request in the same breath).

We distinguished verbal requests (which could be accompanied by nonverbal expressions) from solely nonverbal requests (with no verbal accompaniment) because the literature suggests that in communities where observation is a prevalent mode of learning, nonverbal communication may be emphasised, whereas verbal communication may be emphasised in communities that prioritise schooling (Gallimore,

Boggs, & Jordan, 1974; Merritt, 1998; Scribner & Cole, 1973). Examples of verbal requests are given in the previous paragraph (and often had nonverbal requests accompanying them). Here are examples of solely nonverbal requests for further information:

A child seeks help with a fold by pushing his figure closer to the Origami Lady and looking at her while she helps another child. When she finishes with the other child's figure, he again pushes his figure right in front of her hands and looks at her, waiting, with a beseeching expression.

A child seeks confirmation that she has folded correctly by moving her figure nearer to a peer while undoing and re-doing a fold several times with a questioning look; the child waits until the peer responds with an affirmative gesture before continuing.

A child seeks help with a fold by silently touching a peer's arm twice as she holds her figure toward the peer, until the peer takes the figure and starts fixing it.

Studiously observing without requesting further information. Our analysis focused on the extent to which the children studiously observed without requesting further information, to examine their willingness to proceed on the basis of the information provided for them during the Origami Lady's demonstration and that available from observing the older children. This information was derived by combining the prior categories, yielding the number of segments in which the children observed the Origami Lady without making any requests for further information from her and the number of segments in which the children observed the older children without making any requests for further information from them.

Reliability

A coder who was unaware of the hypotheses coded 21 (68%) of the 31 triads. The first author coded 24 triads (78%) for reliability purposes. The data analysed were the blind coder's 68% of the data (before a health issue arose that precluded her continuing) and the first author's coding of the remaining 32% of the data. The first author's coding was distributed evenly among the three backgrounds; she was also blind to distinguishing which of the Mexican heritage groups had maternal high schooling or basic schooling. There were no systematic differences between the two coders. Pearson correlations were used as a measure of intercoder reliability: observation of Origami Lady's demonstration ($r = .98$), observation of Origami Lady's demonstration without requesting further information ($r = .96$), observation of another child's folds ($r = .85$), observation of another child's folds without requesting further information ($r = .88$), verbal requests for more information (which might be accompanied by nonverbal expressions, $r = .98$), and solely nonverbal requests for more information ($r = .63$).

Results

The primary analyses examined the prediction that the Mexican heritage children whose mothers had only basic schooling would more often observe without requesting additional information beyond that provided by the demonstration, compared with European heritage children whose mothers had high schooling. Because these differences were

⁵ We also examined whether children observed Origami Lady working on another child's folds or on the target child's own folds, which she did rarely (averaging one segment or fewer per session, for each of these circumstances). In both circumstances, the target child usually watched; no differences stood out between groups. Similarly, all children observed if a peer helped the target child (which occurred in less than one segment per session). We coded children's study of the model pig and frog figures that were left on the table, but reliability was too low to analyse this.

predicted on the basis of prior research, the analyses involved one-tailed *t*-tests. We considered combining the primary and the secondary analyses in ANOVAs with all three background groups, but this would inappropriately mix predicted and exploratory analyses. Analyses of gender did not reveal any systematic main effects across the three backgrounds.

Primary analysis: European heritage children with maternal high schooling and Mexican heritage children with maternal basic schooling

No significant difference was expected between groups for observation of the Origami Lady's demonstration, because given the children's high interest in the activity, it makes sense for all the children to studiously watch this demonstration during virtually all the folds. This would produce a ceiling effect, and indeed, all children observed the Origami Lady's demonstration closely. The European heritage children whose mothers had high schooling studiously observed an average of 96% of the demonstrated segments ($SD = 0.04$) and the Mexican heritage children whose mothers had basic schooling studiously observed an average of 98% of them ($SD = 0.03$). For this comparison, we used the proportion rather than raw number of segments containing a demonstration that children observed, due to slight variation in the number of segments in which the Origami Lady provided a demonstration. (When she resumed interaction after each of the two breaks, she did not need to demonstrate a fold if the children did it on their own during the break, but she needed to if the children did not.⁶)

The children's observation of peers' folds—which was spontaneous rather than called for by the setup—differed between the backgrounds, as expected. The European heritage children whose mothers had high schooling studiously observed peers folding during fewer segments than the Mexican heritage children with maternal basic schooling, $t(18) = 2.8$, $p < .005$ (see Table 2 for means and standard deviations).

We expected the European heritage children whose mothers had high schooling to more often try to obtain extra information beyond that available by watching, compared with the Mexican heritage children with maternal basic schooling. In particular, we expected them to make more verbal requests for additional information—and they did so 14.9 times, on average, compared with 7.4 times by the Mexican heritage children with maternal basic schooling, $t(18) = 2.0$, $p < .05$.

We also examined requests that were solely nonverbal, which the literature suggests would be greater in a community that emphasises observation. Requests that were solely nonverbal occurred infrequently, and reliability in coding them was marginal. However, as expected, they came most commonly from the Mexican heritage children with maternal basic schooling (averaging 1.9 times per session versus 0.2 times by the European heritage children whose mothers had high schooling), $t(18) = 2.2$, $p < .025$.

Most important for our predictions was the extent to which children made use of the information available in the Origami

Table 2

Means (and standard deviations) in youngest child's extent of studious observation, requests for extra information, and nondirected explanations

	European High ^a	Mexican Basic ^b	Mexican High ^c
Studiously observe another child folding (number of segments, max = 16)	7.1 (1.7)	9.9 (2.6)	6.5 (2.9)
Requests for extra information: Verbal (frequency)	14.9 (7.9)	7.4 (8.9)	13.1 (10.4)
Requests for extra information: Solely nonverbal (frequency)	0.2 (0.4)	1.9 (2.4)	0.5 (1.2)
Studiously observe Origami Lady without requesting extra information (number of segments, max = 16)	6.6 (2.4)	8.5 (2.7)	7.4 (3.5)
Studiously observe another child without requesting extra information (number of segments, max = 16)	4.7 (2.3)	6.9 (2.7)	4.4 (3.4)

Notes: ^aEuropean High = European heritage with maternal high schooling; ^bMexican Basic = Mexican heritage with maternal basic schooling; ^cMexican High = Mexican heritage with maternal high schooling.

Lady's demonstration and the older children's folding, by studiously observing without trying to obtain further information. The Mexican heritage children with maternal basic schooling more often followed both the Origami Lady's demonstration and peers' folds by solely observing, without making any requests for additional information, compared with the European heritage children whose mothers had high schooling, $t(18) = 1.7$, $p < .05$; $t(18) = 2.0$, $p < .05$.

Secondary analysis: The children's mothers' experience with formal schooling

The secondary analysis explored the relation of maternal experience with school to children's observation, using 2-tailed *t*-tests because of the exploratory nature of these analyses.⁷ The pattern of Mexican heritage children with maternal high schooling most resembled the pattern of the European heritage children whose mothers had high schooling or was intermediate between it and the pattern of the Mexican heritage children with maternal basic schooling.

⁷ *t*-tests are appropriate for our data, because schooling is not continuous or linear in this sample. However, we also examined maternal schooling as a continuous variable. The Mexican heritage children's maternal schooling correlated negatively with observation of the Origami Lady's demonstration, number of segments observing another child, and number of segments observing another child without requesting further information (r s from $-.37$ to $-.52$, p s $< .05$). When children with European heritage were also included, the correlations with maternal schooling were negative for number of segments observing another child and number of segments observing another child without making further requests (r s = $-.41$ and $-.29$, p s = $.01$ and $.05$), and positive for verbal requests ($r = .34$, $p = .03$).

⁶ There was a significant difference in observing the Origami Lady's demonstration of folding the pig, $t(18) = 1.9$, $p < .05$, but not the frog. Mexican heritage children with maternal basic schooling observed the pig folding more than European heritage children with maternal high schooling (for an average of 100% and 90% of the demonstrated folds, SD s = 0.0, 0.1).

Like the other two background groups, the Mexican heritage children with maternal high schooling closely watched the Origami Lady's demonstration (studiously observing during an average of 94% of the demonstrated folding segments, $SD = 0.05$). When their observation of folding was spontaneous rather than called for by a demonstration—in observing another child folding the figure—the Mexican heritage children with maternal high schooling resembled the European heritage children whose mothers had high schooling. They less often studiously observed peers folding than did the Mexican heritage children with maternal basic schooling, $t = 2.8$, $p < .01$, even less (but not significantly so) than the European heritage children whose mothers had high schooling (see Table 2).

In the extent to which they requested extra information (either verbally or nonverbally) beyond that available through observation, the Mexican heritage children with maternal high schooling appeared similar to the European heritage children whose mothers had high schooling. They were intermediate in the number of requests; they did not differ significantly from either of the other background groups.

In the extent to which they followed the Origami Lady's demonstration by solely observing without making requests for additional information, the Mexican heritage children with maternal high schooling were also in an intermediate position between the other two groups, with no significant differences. In observing another child without making requests for additional information, they resembled the European heritage children, observing without requesting further information marginally less often than the Mexican heritage children with maternal basic schooling, $t = 1.90$, $p < .07$.

In general, then, the pattern of the Mexican heritage children with maternal high schooling resembled the pattern of the European heritage children whose mothers had high schooling or stood in an intermediate position between them and the Mexican heritage children with maternal basic schooling. This supports the idea that maternal schooling is associated with lesser frequency of children's learning through studious observation.

Discussion

As predicted, Mexican heritage children whose mothers had less than high school more frequently observed an adult's demonstration and other children's efforts to fold Origami figures without attempting to get extra information beyond that available from the demonstration and from observing the older children, compared with European heritage children whose mothers had at least a high school education. These results are consistent with suggestions that observation is prioritised in some communities, compared with others in which learning may be organised around adult lessons with verbal explanations that often occur out of the context of shared endeavours (Cazden & John, 1971; Rogoff, 1990; Rogoff et al., 1993; Scribner & Cole, 1973).

The finding of more frequent requests for extra information (primarily verbally) by European heritage children whose mothers had a great deal of schooling is in accord with the usual formal school approach, characterised by reliance on adults' verbal explanations. The greater use of solely nonverbal requests by Mexican heritage children whose mothers had only basic schooling is in accord with research that suggests that

nonverbal communication may be more prominent in communities that emphasise observational learning (Cazden & John, 1971; Lipka, 1991; Rogoff et al., 1993; Scribner & Cole, 1973). For example, semi-rural native Hawaiian children were more likely than urban Caucasian children to ask adults for help by nonverbal means, such as imploring looks or silently moving to stand close by the adult or briefly touching her, rather than asking for help verbally (Gallimore, Boggs, & Jordan, 1974). In some indigenous communities, emphasis on observation and nonreliance on verbal instruction may be prioritised even within school, as in this description of a Yup'ik (native Alaskan) teacher's goals for his students:

He does not want to reinforce dependence on verbal instruction during activities that call for observation. Instead, he is expecting them to visually follow the demonstration. He allows the students to move from their seats to get a closer look at his work or the work of one of their classmates. (Lipka, 1991, p. 214)

Seeking patterns of practices, not generalisations across populations

Although our study identified the children's cultural backgrounds in terms of their ethnic heritage and the mothers' experience with the Western institution of school, it is not appropriate to generalise to all children of these backgrounds. In our study, these labels for the children's background are a shorthand descriptor for the particular communities involved, not a categorisation assumed to be homogenous and general. It is an empirical question whether the findings fit with the practices of people from related communities, such as European American communities where high levels of schooling have not been prevalent or where children routinely participate with adults in the work of the community, or Mexican heritage communities that have emigrated from large cities or have lived in the US for a number of generations. In addition to focusing on local communities rather than generalising to ethnic or national groups, we expect variation within communities as individuals vary in their roles and interests and participate in traditions of more than one community (Rogoff & Angelillo, 2002).

However, our findings are consistent with ethnographic evidence that a cultural emphasis on observation characterises indigenous communities of the Americas more generally (Briggs, 1991; Cazden & John 1971; Collier, 1988; Deyhle & Swisher, 1997; Lipka, 1991; Stairs, 1991). We speculate that children's opportunities to observe and participate in the mature work of their communities may contribute to an emphasis on learning through observation in Mexican heritage communities with recent roots in traditional indigenous American community organisation (see Rogoff, 2003). Our study, of course, does not prove this speculation, but contributes to the examination of the cultural patterns that are involved in learning through intent participation (Rogoff et al., 2003).

It was not the aim of our study to demonstrate that particular aspects of the children's cultural experience cause the differences we found in use of observation. There are probably hundreds of features of children's lives that differ for children of varied cultural backgrounds (such as their home language, familiarity with the language of schooling, familiarity

with more than one cultural system, experience of prejudice, parents' incomes and work schedules, involvement with extended family, and so on). Our aim, rather, is to examine a pattern of approaches to learning that relates to a constellation of cultural practices. This approach to culture, focusing on multifaceted and coherent cultural practices rather than on variables "independent" of each other, allows examination of cultural patterns that would be obscured if all but a few differences between communities were "controlled" (Rogoff & Angelillo, 2002).

Schooling as a cultural practice

Our secondary analysis supports the idea that maternal experience in European-origin schooling may be an important cultural aspect of learning in communities of varying ethnic origins. Mexican heritage children whose mothers had completed high school approached the situation more like European heritage children whose mothers also had completed high school. We argue that involvement with the traditions of schooling is a cultural experience, contributing to family teaching and learning practices, whether in European heritage communities or in other communities where schooling has been introduced as a foreign institution (Chavajay & Rogoff, 2002; Matusov, Bell, & Rogoff, 2002; Rogoff, 2003). The children in our study shared the same extent of schooling and the same schools, but their mothers (and probably other family members) differed in experience with the interactional practices widely used in schools.

The results are consistent with several prior studies suggesting that contact with the social organisation of schools may change how indigenous North and MesoAmerican caregivers engage with their children to more closely resemble school-like interaction. Guatemalan Mayan mothers with more extensive schooling more often provided language lessons and directed children's involvement through division of labour, compared with Mayan mothers with little or no schooling, who showed a more collaborative approach and rarely adopted school-like relations with children (Chavajay & Rogoff, 2002; Rogoff et al., 1993). Similarly, younger Inuit caregivers who had attended school were more likely to involve their children in question routines, compared with older Inuit caregivers, who disapproved of children asking them questions (Crago, Annahatak, & Ningiuruvik, 1993). Mexican-immigrant parents who became teachers in the US often developed a school-like form of discourse with their young children, employing known-answer questions liberally (Delgado-Gaitán, 1994; see also Volk, 1997).

Participation in school may socialise specific practices that then gradually become part of indigenous and indigenous-heritage people's own ways of doing things when former schoolchildren become parents, supplanting a traditional emphasis on learning by observation. This also fits with Laosa's (1980b) findings that Chicano mothers tended to use more demonstration for teaching their children than did Anglo mothers, unless the Chicano mothers had equally high schooling as Anglo-American mothers. Laosa (1982) suggested that

Among Chicano women, schooling has a marked impact on certain behavioral dispositions that determine the manner in which women, once they become mothers, interact with their children. Such findings raise provocative questions about the

role that schooling plays in influencing the evolution of culture, and specifically in influencing the evolution of cultural patterns of family interaction. (p. 797)

Like Laosa, we do not regard schooling as simply creating instructional formats where there were none before. Instead, schooling may reshape instructional formats from more traditional ways of a community. We expect that sometimes school ways compete with and replace traditional ways, but that this is not necessarily so—school ways could simply be added to the repertoire to be used in some circumstances, with traditional ways used in other circumstances. It would be interesting to extend the current research to other communities that vary in familiarity with traditional indigenous organisation of learning and with formal school ways of organising learning.

In addition, it would be illuminating to observe children of varying backgrounds in settings in which learning through observation is even more necessary than in the setting used in this study—such as when children are party to activities in which they cannot ask for feedback (e.g., as eavesdroppers). Likewise, it would be informative to examine children's observation when learning through observation is less effective or less necessary, such as when observation is impeded or extensive explanations are available.

Understanding variations in cultural patterns for learning through observation may be particularly important in improving the ability of schools to serve children whose family and community backgrounds emphasise observational learning. Teachers and other adults can foster new ways of learning and also strengthen familiar traditional ways, by recognising and adapting school practices to cultural variations in traditional modes of learning.

At the same time, children whose community traditions place less emphasis on learning through observation may benefit from greater familiarity with this time-honoured approach to learning from ongoing activities, in addition to the didactic approaches that may be more familiar to them. Children everywhere use observation, for example, in learning their first language. Honing skill in observing is likely to be an advantage for all children.

The research emphasis that has been placed on learning in didactic situations may reflect researchers' own extensive experience in this form of learning—a prerequisite for being a researcher is having spent well over a dozen years excelling in the formats for learning that are employed in schools. Research in communities in which observational formats for learning are emphasised can help to garner an understanding of how keen observation is used in the process of participating in ongoing shared endeavours.

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