

Children's Attention to Interactions Directed to Others: Guatemalan Mayan and European American Patterns

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This study investigated differences in attention and learning among Guatemalan Mayan and European American children, ages 5–11 years, who were present but not addressed while their sibling was shown how to construct a novel toy. Each child waited with a distracter toy for her or his turn to make a different toy. Nonaddressed children from Mayan traditional families (with little maternal involvement in Western schooling; $n = 40$) showed more sustained attention and learning than their counterparts from Mayan families with extensive involvement in Western schooling ($n = 40$) or European American children (with extensive family involvement in schooling; $n = 40$). The nonaddressed Mayan children from highly schooled families in turn attended more than the European American children. These findings are consistent with research showing that traditional indigenous ways of organizing learning emphasize observation of ongoing interactions.

Keywords: attention, culture, learning, observation, indigenous

This study examined attentiveness and learning of 5- to 11-year-old Guatemalan Mayan and European American children who were present as their sibling was taught how to construct a toy. Attending to events that are not addressed to oneself (*third-party attention*) appears to be central to learning in communities with Indigenous Mesoamerican history.

Learning from third-party attention may be an important but overlooked developmental context. Although most research on teaching and learning has focused on situations in which children are addressed directly, some research indicates that events not directed at children provide them with important information in many communities. Middle-class U.S. toddlers assess a stranger's character or the emotional valence of a new situation by observing

other people's reactions to the stranger or situation (Feiring, Lewis, & Starr, 1983; Repacholi & Meltzoff, 2007). Children across many communities also learn vocabulary and appropriate language use by overhearing conversation (Akhtar, 2005; Barton & Tomasello, 1991; Ochs, 1988; Oshima-Takane, Goodz, & Deverensky, 1996; Schieffelin, 1991; Ward, 1971).

Learning by Intent Community Participation: An Indigenous Model of Teaching and Learning

Third-party attention may be especially important in communities in which children have access to a wide range of family and community activities as *legitimate peripheral participants* (Lave & Wenger, 1991; Rogoff, 2003; Ward, 1971). Ethnographic research on Indigenous-heritage North and Central American communities frequently has noted children's keen observation of the activities of their community, as they are integrated in everyday work and social life (Cancian, 1964; Chamoux, 1992; Corona & Pérez, 2005; de Haan, 1999; de Leon, 2000; Modiano, 1973; Suina & Smolkin, 1994). For example, Gaskins (2000) writes of Mayan children in Yucatan:

Much of a Mayan child's time is spent observing the other actors in the compound By age 3, children can usually report accurately where every member of their household is and what he or she is doing. The child often appears to be keeping sort of a running tab on compound activities through careful observation. (p. 382)

Learning by attending to ongoing events and beginning to pitch in when ready seem to be key features of a cultural pattern of organizing learning common in many Indigenous communities of the Americas, forming a system dubbed *intent community participation* (see Rogoff et al., 2007; Rogoff, Paradise, Mejía Arauz, Correa-Chávez, & Angelillo, 2003). In the Mayan community of our study, children traditionally have been included in almost all activities and are expected to learn by observation and by pitching

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in (Morelli, Rogoff, & Angelillo, 2003; Rogoff, Mistry, Goncú, & Mosier, 1993). Similarly, Navajo children are incorporated "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). The use of observation can be seen in the way that novice adults in a footloom factory in Guatemala watched a skilled weaver for weeks without asking questions or receiving explanations; after some weeks, they began weaving skillfully (Nash, 1967).

Learning by intent community participation would necessarily be more limited in European American middle-class communities, where children are routinely segregated from community work and many social activities. For example, in middle-class communities, children are rarely present, and may not be allowed, in workplaces as adults go about earning their livelihood (LeVine & White, 1992; Morelli et al., 2003; Rogoff, 2003; Zelizer, 1992).

Lessons Out of the Context of Productive Activity: A Middle-Class Cultural Pattern

Restrictions on opportunities to observe may relate to the frequent engagement of middle-class adults in managing children's attention and learning in child-focused conversations and mini lessons that mirror school speech routines (Blount, 1972; Haight, 1991; Harkness, 1977; Heath, 1983; Morelli et al., 2003; Ochs & Schieffelin, 1984). For example, when showing toddlers how to operate novel toys, middle-class caregivers in the United States and Turkey often provided children with language lessons and used mock excitement and praise to manage the children's attention and involvement (Rogoff et al., 1993). Similarly, European American middle-class mothers in a teaching situation took responsibility for making their toddlers learn by trying to arouse interest and refocus attention, whereas Gusii (Kenyan) mothers with little schooling seemed to expect toddlers to be able to take responsibility for completing the task as shown (Dixon, Levine, Richman, & Brazelton, 1984).

Community Differences in Children's Observation and Attention

A few studies have explicitly compared the attention of children from families of Mesoamerican Indigenous heritage with that of middle-class children. Two studies found that Mayan toddlers and their mothers showed keen simultaneous attention to multiple events of interest, whereas European American middle-class toddlers and caregivers more commonly quickly alternated their attention between two events, attending to one event at a time (Chavajay & Rogoff, 1999; Rogoff et al., 1993).

Similar work has found that U.S. Mexican-heritage children whose families migrated from areas with Indigenous history (and whose mothers had little schooling) relied more on observation as a source of information when learning how to fold origami figures than European American middle-class children, who tended to press for more information than was presented in the demonstration (Mejía Arauz, Rogoff, & Paradise, 2005). Moreover the U.S. Mexican-heritage children more often simultaneously attended to multiple ongoing events during the demonstration than the European American middle-class children, who more commonly alter-

nated their attention (Correa-Chávez, Rogoff, & Mejía Arauz, 2005). The findings are consistent with the idea that the U.S. Mexican-heritage children whose families immigrated from Indigenous-heritage regions may be more familiar with learning through keen observation of ongoing events. Indeed, correlating data from these two studies showed that the children who more often attended simultaneously tended also more often to observe the demonstration without requesting further information.

In these studies, children were directly addressed, but in a system based on intent community participation, a key situation for learning is observation of third-party events—the focus of the present study. We know of only one comparative study that examined children's attention when not directly addressed: European American middle-class children were more likely to be off task and distracted when not controlling the moves in a game than were Navajo children, who tended to observe the game even when they were not directly involved (Ellis & Gauvain, 1992).

In addition to examining children's third-party attention, we were curious whether middle-class children, used to being addressed directly, might attempt to disrupt or to marshal attention to themselves during interactions that did not directly involve them. European American middle-class toddlers engaged in more attention seeking and interruption when their mothers were busy than did Mayan children or Efe children from the Democratic Republic of Congo (Rogoff et al., 1993; Verhoef, Morelli, & Anderson, 1999). Indigenous children of several Mexican communities were found to seldom engage in attention seeking (de Haan, 1999; Gaskins, 2000; Paradise, 1996).

Schooling, Cultural Patterns, and Familiarity With Traditional Indigenous Ways

Family participation in the cultural institution of school may play an important role in the organization of learning (Chavajay & Rogoff, 2002; Correa-Chávez et al., 2005; Laosa, 1980, 1982; Mejía Arauz et al., 2005; Rogoff et al., 1993). Although extensive schooling has been central to European American childhood for generations (Bronfenbrenner, McClelland, Wethington, Moen, & Ceci, 1996; Hernandez, 1997), its role in organizing children's lives is often overlooked. Yet many practices common in European American middle-class communities—such as child-focused activities and language lessons—are rare in communities without an extensive history of schooling (Briggs, 1991; Fortes, 1938/1970; Gaskins, 1999; Heath, 1983; LeVine, 1990; Morelli et al., 2003; Scribner & Cole, 1973; Ward, 1971).

In the past century, schooling has spread around the world from Europe and North America (Meyer, Ramirez, & Soysal, 1992). As schooling has become increasingly prominent in the Mayan town of San Pedro la Laguna, Guatemala (where two thirds of the data for this study was collected), mothers with more schooling more often engage with children in ways that resemble school ways of interacting. Rogoff et al. (1993) observed that Mayan mothers with 6–9 grades of schooling more often treated their children as conversational peers and engaged them in language lessons than did Mayan mothers with 0–3 grades of schooling. When working with children on a puzzle, Mayan mothers with more than 12 grades of schooling more often attempted to manage the children's efforts, proposed division of labor strategies, and directed the

children—approaches common in schools (Chavajay & Rogoff, 2002).

Similarly, in U.S. Mexican-heritage communities, maternal schooling has been related to observation and management of attention. During an origami demonstration, both European-heritage and Mexican-heritage U.S. children whose mothers had extensive school experience relied less on observation as a source of information and less often attended simultaneously to ongoing events than Mexican-heritage U.S. children whose mothers had little school experience (Correa-Chávez et al., 2005; Mejía Arauz et al., 2005). In teaching their children, Chicana/Mexican American mothers with more extensive experience in school resembled European American mothers, using more frequent questions and praise, compared with Chicana mothers with less school experience, who more often used modeling (Laosa, 1980, 1982; Moreno, 2000).

These studies draw attention to the cultural practice of schooling. However, we are not arguing that maternal schooling by itself is responsible for changes in how children approach learning (see Rogoff & Angelillo, 2002). Increased schooling is only one aspect of a constellation of associated features of many communities' changes over time. For example, between 1976 and 1999 as school became a central part of children's daily lives in the Mayan community of San Pedro, there was also a shift from subsistence agriculture to cash crops, tourism, and occupations requiring certification (Magarian, 2001; Paul, 1996; Rogoff, Correa-Chávez, & Navichoc Cotuc, 2005). These major societal changes were accompanied by many changes in the lives of children and families. Compared with children in 1976, the children in 1999 tended to have fewer siblings, associate less with multiage peers, contribute less to the family economically, aspire to complete more grades in school than their parents had aspired to complete, and speak more Spanish (Correa-Chávez, Rogoff, & Mejía Arauz, 2005; Rogoff et al., 2005). Similar patterns have been found in historical data in the United States and in a number of communities around the world when schooling becomes an organizing institution in families and communities (Hernandez, 1997; Tapia-Urbe, LeVine, & LeVine, 1994).

Increased schooling seems to be but one part of a constellation of cultural shifts, in directions often resembling current middle-class European American ways. In the Tz'utujil Mayan language of San Pedro, these are called *kaxlaan* (pronounced "cosh-LON," meaning *foreign*) ways—a term we will use to refer to the practices of Mayan families with extensive Western schooling.

The Present Study

In this study, we examined cultural variation in how children use their attention and learn during interactions that are not addressed to them—in this case, waiting while their sibling built a toy with an adult. We expected children familiar with traditional Mayan ways to attend more to interactions that were not directed to them than would European American middle-class children and also more than Mayan children whose families are more familiar with *kaxlaan* ways (as indexed by extensive maternal schooling and related practices).¹ We also examined the children's learning when they returned a week and a half later to pick up their toys and were unexpectedly given the opportunity (with little assistance) to make the same toy that their sibling had made previously.

Method

Participants and Their Communities

The participants in this study were 120 children between the ages of 5 and 11 years, in 20 sibling pairs from each of three backgrounds: Mayan traditional, *kaxlaan* Mayan, and European American middle-class. The children's ages and girl-boy ratios were similar across the three backgrounds (see Table 1). Children in all three communities attended school and were at similar grade levels.

Both the Mayan traditional and the *kaxlaan* Mayan participants came from San Pedro, a Tz'utujil Mayan town of about 13,000 in Highland Guatemala. Over the past decades, San Pedro has modernized rapidly. Three decades ago, electricity arrived, and now many residents have televisions, some have cell phones, and a few have computers. Tz'utujil Maya (a language unrelated to Spanish) continues to be the predominant language in town although Spanish is also commonly spoken as the national language and main language of school. Schooling has extended rapidly, from the grandparent generation not attending at all or for only 1 or 2 years to wide variation in the present parent generation from not attending school to obtaining a university education (Rogoff et al., 2005). This variation in familiarity with traditional Mayan and with *kaxlaan* Mayan ways creates an unusual opportunity to study their relation to children's attention and learning.

Mayan traditional. Children from the Mayan traditional group have mothers with 6 or fewer years of schooling (averaging 2.0 grades, range 0–6). Their families tended to be larger than *kaxlaan* Mayan families, and they tended to speak more exclusively in the Mayan language and be less fluent in Spanish. The majority of the Mayan traditional mothers ($n = 13$) worked in the home, cooking and looking after the family. The remainder were weavers ($n = 4$) or sold tortillas and bread ($n = 3$). The fathers averaged 5 grades of schooling, and the majority ($n = 13$) worked as day laborers in other peoples' fields. The rest of the fathers worked as drivers, a fisherman, a nurse, and a teacher or worked in a Christian institute. The grandfathers averaged a kindergarten education, and the grandmothers averaged just a few months of school.

Kaxlaan Mayan. Children from the *kaxlaan* Mayan group have mothers with 12 years of schooling (the highest level available in San Pedro). Their families tended to have fewer children and have more contact with non-Mayan peoples through work and travel out of town. Most of the mothers were teachers ($n = 14$), and the remainder had studied to be secretaries ($n = 3$), accountants ($n = 2$), and a nurse ($n = 1$). The fathers averaged 11 grades,

¹ We did not include European American children whose families had little schooling because we concluded, on the basis of ethnographic studies, that this background would not help address our question, that is, the extent of observation by children in communities that have traditionally integrated children in the range of activities and have expected children to learn by observing and pitching in, compared with the extent of observation by children whose family background has for generations included schooling and other forms of segregation from the range of adult activities of their community. It would be a different, though interesting, question to examine the forms of support for learning that occur in the rare European American communities in which schooling has not been prevalent across generations (such as in Appalachia). There is little to suggest what forms of support for learning may prevail in such settings.

Table 1
Gender and Average Age of the Children

Participant information	Mayan traditional	Kaxlaan Mayan	European American middle-class
	Children who observed mouse (waited first)		
Gender	10 girls/10 boys	8 girls/12 boys	12 girls/8 boys
Age (range)	6.0 years (5-8)	6.3 years (5-10)	6.5 years (5-9)
	Children who observed frog (waited second)		
Gender	14 girls/6 boys	14 girls/6 boys	15 girls/5 boys
Age (and range)	8.8 years (7-11)	9.0 years (6-11)	8.9 years (7-10)

and like their wives, most fathers worked as teachers ($n = 12$); the rest were accountants, had their own business, were drivers, or worked as a painter. Grandfathers averaged a second grade education, and grandmothers averaged a kindergarten education.

European American middle-class. Children from the European American middle-class background come from Santa Cruz, California, a city of approximately 55,000 residents, 79% of whom consider themselves to be racially White. Like most Santa Cruz residents, the mothers had at least 12 years of schooling (average = 16.8 grades, range 14-20), and families were small. Most of the mothers were stay-at-home mothers ($n = 11$); the remainder had occupations including college professor, freelance writer, lawyer, and teacher. The fathers averaged 16 grades of schooling. The most common occupations of the fathers were computer work ($n = 3$) and contractor ($n = 3$); the rest included such occupations as probation officer, therapist, engineer, and doctor. All of the grandparent generation had completed at least high school; grandfathers averaged 16 grades, and grandmothers averaged 15 grades.

Children of the three backgrounds differed in their economic contributions to their families' work, consistent with our argument that attention to other people's activities is an important learning tool for children who have access to the range of community and family activities. Along with demographic and schooling information, we asked the mothers whether the children accompanied their parents to work and whether they helped out at work: 33% of the Mayan children from families familiar with traditional ways engaged in productive work, whereas only 15% of the children from *kaxlaan* Mayan families and none of the children from European American middle-class families did so, $\chi^2(2, N = 110) = 836.3, p < .01$.

Procedure

Each sibling served as a nonaddressed child while the other sibling made a toy in Session 1, and each constructed the sibling's toy in Session 2. All of the first sessions were completed before any of the second sessions occurred to ensure that children could not tell each other that they had a chance to make the toy that their sibling had made in the first session. This allowed us to study their attention when there was no obvious use for the information available in watching their sibling make a toy.

The first nonaddressed child was always the younger child (who waited while the sibling made a mouse), and the second nonaddressed child was always the older child (who waited while the sibling made a frog). Hence, children's age, order of constructing a toy, and which toy they made were purposely not counterbal-

anced. Thus, we do not compare differences according to the children's age, order of observing, or toy made.

Session 1 (third-party attention). A local adult (a Mayan or European American "Toy Lady") welcomed the children to a room with two tables. On the main table were models of each of the toys as well as the parts used to make them. The first toy was a foam mouse that runs via a spool and rubber band mechanism, and the second toy was an origami paper frog that jumps when its tail is pressed down. (See Figure 1.) The children indicated no previous experience with these toys, although in both the United States and Guatemala, some children had experience with paper folding. We think that the scenario would resemble family-neighbor interactions to some extent in each of the three backgrounds: choosing to participate in an interesting activity led by a local unrelated (but probably familiar) adult, who demonstrates in a casual, friendly way.

The Toy Lady set up the nonaddressed child to wait by saying, "I'm going to start with your sister/brother, and she/he is going to make a mouse, and when she's/he's done, you can make a frog. While she/he does that, how about you sit here?" At this point, she led the older sibling to the main table and the waiting, nonaddressed child to the side table. Once the children were seated, she repeated to the children that they would be making different toys, so they would not think that paying attention to their sibling's toy construction would help them make their own toy: "You [child's name] will make this mouse, and you [child's name] will make this frog. I'm going to start with you [name of child making the mouse], and while we do that, you [nonaddressed child] can play with this." She handed the nonaddressed child a distracter toy that is briefly interesting—a "do-nothing machine," with a crank that rotates in grooves in a wooden block.

The Toy Lady then directed her attention to the child she was guiding in making the toy mouse. When she was done constructing the toy mouse with the first child, she asked the children to switch seats, telling the new nonaddressed child that she or he could play with the distracter toy while waiting as the other sibling made the origami frog.

The Toy Lady followed a script ensuring that all children were taught the same way and that she did not interact with the nonaddressed child. The Toy Lady was not told about the second session until after the first session was completed. Neither was she told that the focus of the study was third-party attention or learning nor that there was a comparison being made among children of different communities. She was told that we were interested in how children learned to make the toys and also were curious about what

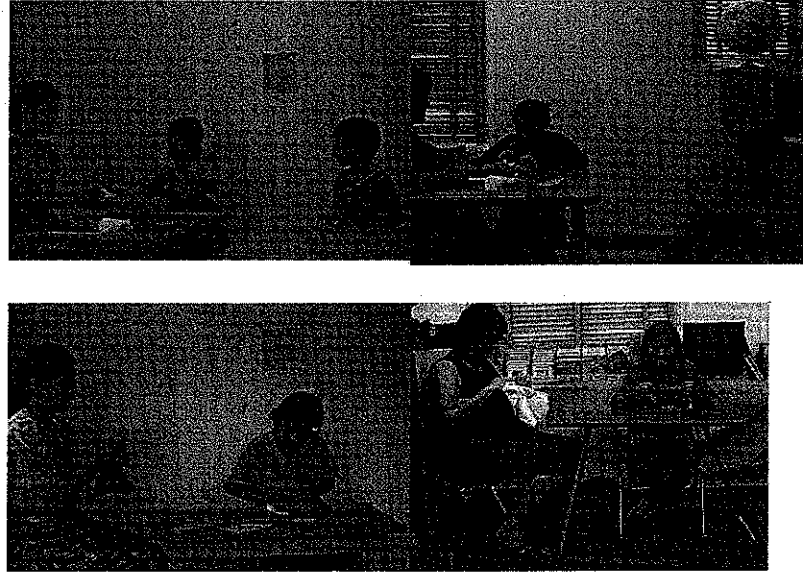


Figure 1. Scenarios for Sessions 1 and 2. Session 1. Mayan (top left) and European American (top right) children wait their turn and attend (or not) to the Toy Lady and their sibling constructing the mouse toy. Session 2. Mayan (bottom left) and European American (bottom right) children attempt to construct a frog by themselves, while the Toy Lady is busy with her work.

the nonaddressed children would do naturally as they waited, so she should neither encourage them to do anything nor inhibit them from doing anything.

In case the nonaddressed child attempted to become involved or to disrupt the construction activity, the Toy Lady's script also included instructions for how to respond in a polite way that made it clear that she was only working with the focal child. For example, if a nonaddressed child commented that his kitten would enjoy playing with the toy mouse, she would say, "Oh that's nice," and then specifically address the child at the table, saying for example, "Now, Kristin, the next thing we are going to do is attach this here." If the nonaddressed child picked up their sibling's construction materials, the Toy Lady would gently discourage involvement by telling the child that she or he would soon have a chance to make the other toy. Session 1 took about 5 min.

Session 2 (nonaddressed children's learning). Approximately 10 days later, the children returned individually to pick up their toys, and each was given the chance to make the toy they had not made before. The session was designed not to seem like a test, and the children did not seem to treat it as a test. The Toy Lady told the child that she had extra materials and asked if the child would like to make the toy that their sibling had made before, while she finished her work. The Toy Lady was busy embroidering or knitting so that the child would not expect an instructional session and so that the Toy Lady would have reason not to respond immediately if asked for help (Figure 1).

As a measure of learning, we examined the extent of help needed by the child to make the toy, using a graduated series of scripted hints. The Toy Lady first waited for the child to complete the step, then provided a small hint if the child could not complete the step, then provided a bigger hint if the child still could not complete it, then showed a little bit of the step, and lastly com-

pleted that step. At the beginning of each step, she again waited for the child to take the lead before providing the first hint. Session 2 took about 4 min. Both sessions were videotaped.

Procedural check. A procedural check on 25% of the data found that the Toy Ladies in both communities followed the script in similar ways. Most important, in Session 1, neither of the Toy Ladies addressed the nonaddressed child or encouraged that child's attention to anything in particular. In Session 2, the Toy Ladies in both communities provided the scripted hints similarly.

Coding of Session 1: Attention, Disruption/Attention Seeking, and Attempts to Collaborate

Two coders who were members of the participants' cultural communities and unaware of the hypotheses coded the nonaddressed child's attention in 5-s segments. In the same 5-s segments, they also coded separately any attempts to disrupt/get attention or to collaborate in the activity.

Attention coding was determined on the basis of the child's posture, eye gaze, and activities. The position of the nonaddressed child's chair (several inches forward of the sibling's position and parallel to it at a specified distance off to the side) was designed both to indicate to the children that the nonaddressed child was not part of the toy construction and to make it easy for coders to see when the child turned his or her head to watch or moved the chair into a position that facilitated seeing the toy construction (Figure 1).

The nonaddressed child's attention in each 5-s segment was coded in four categories: showing sustained attention, simply glancing with brief interest, giving a seemingly uninterested look, or not attending to the construction activity (if none of the three categories of attention were coded). Only one segment in the

whole corpus was coded as an uninterested look, so this segment was counted as not paying attention to the construction, and the category of uninterested look was excluded from further analyses.

Sustained attention to the construction. The child's primary focus of attention for most of the 5-s segment was the construction activity. The child displayed alert body posture and energetically watched the construction of the toy, appearing interested in the process. The child could glance away momentarily or turn the crank of the distracter toy but without seeming to devote primary attention to the other activity. In most segments coded as sustained attention, the child attended to the construction activity for the entire 5-s segment.

Brief glances. The child attended sporadically and not intently to the construction during the 5-s segment, with momentary glances. Glancing did not maintain a focus on the construction (unlike the alternating attention found in previous research, in which the focus was maintained with very brief interruptions). Rather, the child was often focused on the distracter toy or her or his own imaginary play or was "spacing out."

Disruption/attention seeking. For each 5 s, the coder separately noted whether the nonaddressed child attempted to disrupt the construction activity or divert the attention of the Toy Lady or sibling away from their project to herself or himself in a "loud," insistent, and/or repetitive way. For example a child might grab materials away to get attention (not to participate), crawl under the table and look to see if this is noticed, or try to engage others in conversation out of nowhere about something unrelated to the toy building, such as, "Where'd you get that from?"

Attempts at collaboration. We also separately coded whether the child attempted to be a part of the construction activity. The child could ask or try to be involved in the construction, provide hints, look at the Toy Lady questioningly as if asking permission to join, or nod along with the Toy Lady's instructions as if "verifying" that the information about the construction was correct.

Coding of Session 2: How Much the Children Did by Themselves

Coding help. Two additional coders who were also members of the participants' communities, unaware of the hypotheses of the study and of the procedure in Session 1, coded the videotapes of Session 2 as the children attempted to build the toy by themselves. The coder assigned points to each step according to whether the Toy Lady had provided the child with the following levels of assistance: 0 points, *needed no help*; 1 point, *needed a small hint*; 2 points, *needed a larger hint*; 3 points, *needed to be shown a bit*; or 4 points, *needed the step done for her or him*. The mouse toy consisted of four steps and the frog toy of five steps, yielding maximum scores of 16 or 20, respectively, for the amount of help the child seemed to need.

Reliability. Two different sets of research assistants coded the videotaped data. For each session, a bilingual Tz'utujil-Spanish assistant coded the Guatemalan data, and a bilingual English-Spanish assistant coded the U.S. data. After coding of the U.S. data was complete, the U.S. coders also coded 20% of the Guatemalan data (using sessions that were in Spanish) to ensure consistency. In addition, Maricela Correa-Chávez, who is bilingual in English and

Spanish and has a working knowledge of Tz'utujil, coded 35% of the data from each community for reliability.

Reliability for Session 1, calculated by means of Pearson correlations, was as follows between the U.S. coder and Maricela Correa-Chávez, between the Guatemalan coder and Maricela Correa-Chávez, and between the two community coders, respectively: sustained attention, $r = .99, .98, \text{ and } .99$; brief glances, $r = .91, .85, \text{ and } .86$; not attending to construction, $r = .98, .97, \text{ and } .98$; disruption/seeking attention, $r = .92, 1.0, \text{ and } 1.0$; and attempts for collaboration, $r = .84, 1.0, \text{ and } .85$.

Reliability (Pearson correlations) for the amount of help the child seemed to need in Session 2 was $r = .96, .88, \text{ and } .90$, between the U.S. coder and Maricela Correa-Chávez, between the Guatemalan coder and Maricela Correa-Chávez, and between the two coders, respectively.

Results

We first present cultural differences in children's attention to others' activities and then differences in children's disruptions and collaboration attempts in Session 1. Then we examine the children's learning as seen in the amount of help the children needed in Session 2, investigating cultural differences as well as relations with the children's attention in Session 1.

Session 1: Third-Party Attention, Disruption, and Collaboration

We analyzed data for Session 1 using proportions of the time segments because the children varied in how long they spent constructing the toys. However, there were no systematic statistical differences among the three cultural backgrounds in how long the sibling pairs took to construct the toys. We combined the data involving the two siblings and the two toys, after determining that the same pattern appeared for each. (Note that any difference between the siblings or toys would not be interpretable in terms of ages or birth order of the siblings, the nature of the two toys, or order effects, as these were purposely not randomly varied.)

Third-party attention. Planned comparisons of the three cultural backgrounds were used to test the attentional predictions. This type of analysis is the most appropriate when one has directional predictions (Tabachnick & Fidell, 2001). Table 2 shows the means and standard deviations separately for the two ages/toys as well as combined for all analyses. Figure 2 is a casegraph showing the amount of time that individual children in the three cultural backgrounds spent engaged in sustained attention to the construction, glancing briefly, or not attending at all. The analyses of primary interest are those involving sustained attention and no attention to the construction.

As expected, Mayan children from more traditional families engaged in more sustained attention than did children from European American middle-class families in 62.4% versus 30.6% of the time segments, $t(117) = 6.65, p < .01$. The Mayan children from more traditional families also used sustained attention nonsignificantly more than children from Mayan families more familiar with *kaxlaan* ways in 62.4% versus 54.9% of the segments, $t(117) = 1.69, p = .06$. In turn, the children from *kaxlaan* Mayan families engaged in more sustained attention than the European American

Table 2
 Mean Percentage and Standard Deviation of Segments in Which Children Attended to Construction

Form of attention	Mayan traditional		Kaxlaan Mayan		European American middle-class	
	M	SD	M	SD	M	SD
Children who observed mouse (waited first)						
Sustained	69.1 ^a	17.5	59.3 ^a	14.3	33.4 ^a	25.5
Not attending	28.2 ^b	17.1	34.9	14.9	43.4 ^b	20.5
Brief glances	2.7 ^c	3.1	5.8 ^d	5.1	23.1 ^{c,d}	15.6
Children who observed frog waited second						
Sustained	55.7 ^a	21.5	50.5 ^b	22.6	27.7 ^{a,b}	23.3
Not attending	38.1 ^c	21.1	45.4	22.3	50.1 ^c	22.5
Brief glances	6.2 ^d	6.0	4.1 ^e	3.2	22.2 ^{d,e}	15.0
All children						
Sustained	62.4 ^a	20.4	54.9 ^a	19.2	30.6 ^a	24.3
Not attending	33.2 ^b	19.6	40.2	19.5	46.8 ^b	21.5
Brief glances	4.4 ^c	5.0	5.0 ^d	4.3	22.6 ^{c,d}	15.1

Note. In each row, superscripted letters indicate significant differences across cells with the same letter (according to planned contrasts).

middle-class children in 54.9% versus 30.6% of the segments, $t(117) = 5.08, p < .01$.

Also, as expected, the children from European American middle-class families spent more time segments not attending to the construction activity compared with the Mayan children from more traditional families in 46.8% versus 33.2% of time segments, $t(117) = 2.96, p < .01$. The children from *kaxlaan* Mayan families spent an intermediate amount (40.2%) of the segments not attending (which was not significantly different than children from either of the other backgrounds).

Because no specific pattern was predicted for the extent of briefly glancing, we analyzed these residual data with a one-way analysis of variance (ANOVA) with post hoc Bonferroni correction, $F(2, 117) = 47.41, p < .01$. Post hoc tests showed that the children from European American middle-class families employed more brief glancing (sporadically looking at the construction in 22.6% of the time segments) than did Mayan children from more traditional families (4.4%), $p < .01$, or children from *kaxlaan* Mayan families (5.0%), $p < .01$. There were no differences between the two Mayan groups in their use of brief glancing.

There were significant main effects of gender for both sustained attention and not attending to the construction; however, none of the within-community gender comparisons were significant with Bonferroni correction. Overall, girls showed more sustained attention than boys, $F(1, 118) = 4.05, p < .05$, and boys more often did not attend than girls, $F(1, 118) = 9.21, p < .01$.² There were no significant gender differences in extent of glancing.

Because the Mayan children's extensive sustained attention might seem incompatible with their simultaneous attention to multiple ongoing competing events (found by Chavajay & Rogoff, 1999; Rogoff et al., 1993), we explored the relation between sustained attention and simultaneous attention. Al-

though we did not code simultaneous attention per se and there were not many events occurring at once in our set-up, we do have some indication of the percentage of sustained attention segments in which the construction activity was the only activity to which the child attended. As would be expected, when the European American children showed sustained attention to the construction activity, they less often attended to other possible foci of attention, such as the distracter toy. European American children spent 43.7% of their sustained-attention segments attending only to the construction. In comparison, Mayan children spent 33.8% of their sustained-attention segments attending only to the toy construction, $t(153) = 2.36, p < .01$.³ This exploratory analysis is consistent with idea that the Mayan children's sustained attention also sometimes involved simultaneous attention to several events.

Disruption/attention seeking and collaboration. As expected, the European American middle-class children engaged in more disruption/attention seeking than the Mayan children. Because only 1 child from each of the Mayan backgrounds attempted to disrupt or to attract attention, we performed a nonparametric chi-square test, $\chi^2(9, N = 120) = 836.3, p < .01$. Eleven of the

² The means by gender for sustained attention were as follows: Mayan traditional girls, 64.8% of time segments; Mayan traditional boys, 58.8%; *kaxlaan* Mayan girls, 60.6%; *kaxlaan* Mayan boys, 48.0%; European American girls, 36.2%; and European American boys, 18.8%. The means by gender for not attending were as follows: Mayan traditional girls, 29.9% of segments; Mayan traditional boys, 36.0%; *kaxlaan* Mayan girls, 35.0%; *kaxlaan* Mayan boys, 46.4%; European American girls, 41.0%; and European American boys, 58.8%.

³ Because prior studies of attention management in San Pedro found no differences in the use of simultaneous attention related to maternal schooling (Chavajay & Rogoff, 1999; Rogoff et al., 1993), the average of all of the Mayan children was compared with that of the European American children.

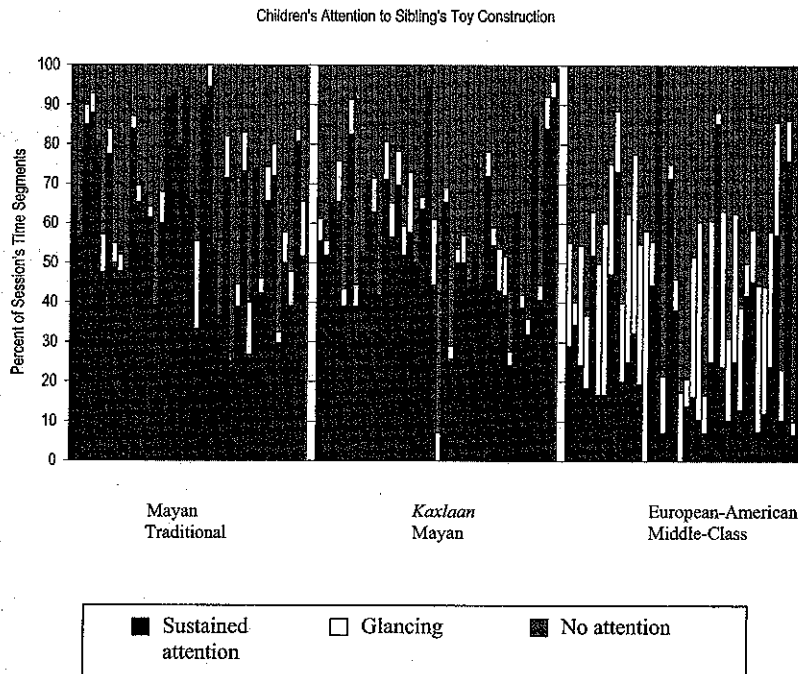


Figure 2. Casegraph illustrating how individual children attended to the construction activity (combining both siblings). Sustained attention = black at the bottom of the graph; glancing = white in the center of the graph; no attention = gray at the top of the graph.

European American children disrupted or sought attention, amounting to 3.61% of the time segments among children of this background versus 0.08% of the time segments for each Mayan background ($SDs = 10.25$ for European American, 0.51 for Mayan traditional, and 0.51 for *kaxlaan* Mayan).

None of the disruptions occurred during segments in which children showed sustained attention; 60% occurred in segments in which the nonaddressed child was not paying attention, and 40% were in segments when the nonaddressed child simply glanced at the construction. This pattern is consistent with the idea that the European-heritage U.S. children would be more disruptive when not directly involved (either by being addressed or by attending closely to an interaction addressed to others).

Children of both genders engaged in disruptions among the European American children (5 girls and 6 boys). However boys were more insistent, disrupting in 9.4% of time segments compared with 0.8% of time segments for girls, $t(38) = 2.67, p < .01$.

We did not make predictions concerning whether children from one particular background would attempt more collaboration than others in the sibling's toy construction; hence, we analyzed these data using a one-way ANOVA with Bonferroni correction. The ANOVA and post hoc tests showed no significant differences in the three backgrounds; attempts to collaborate were rare in all backgrounds.⁴ There were no significant gender differences in attempts to collaborate.

Session Two: Learning

Because preliminary analysis revealed different patterns in the amount of help needed by the children who observed (and were then constructing) the mouse and the children who observed (and

were then constructing) the frog, we present the planned contrasts for the two toys separately. The scores for amount of help needed were converted to percentages, because the maximum scores differed for the two toys (due to differing numbers of steps needed to construct them).

Constructing the mouse. There were not significant differences between the backgrounds in how much help the children needed to make the toy mouse, nor were there significant correlations with the amount of sustained attention shown to the mouse construction in Session 1. For the mouse, there appeared to be a ceiling effect—the children needed little help from the Toy Lady. Much of the information about what to do was contained in the mouse materials themselves. For example, even without having watched, a child might assume the string needed to be wrapped around the spool and do this without help. It would be more difficult to infer a correct fold for the origami frog. Table 3 shows means, standard deviations, and correlations.

Constructing the frog. The Mayan children from more traditional families needed less help to complete the frog than did the children from European American middle-class families, $t(53) = 3.34, p < .01$, or the children from *kaxlaan* Mayan families, $t(53) = 2.03, p < .05$. The Mayan children from more traditional families were given help at an average of 44% of the scale, compared with 52% for the children from *kaxlaan* Mayan families and 59% for the European American middle-class children. The

⁴ The means and standard variations were as follows: Mayan traditional, 1.37% of time segments ($SD = 3.27$); *kaxlaan* Mayan, 2.36% of time segments ($SD = 6.06$); and European American middle-class, 0.67% of time segments ($SD = 2.05$).

kaxlaan Mayan children were intermediate, with a not-quite-significant difference with the European American children, $t(53) = 1.42, p = .08$.

The children who engaged in more sustained attention to the frog construction in Session 1 needed less help from the Toy Lady to complete the frog when they had the chance to make it in Session 2, across the three backgrounds, $r = -.47, p < .01$ (Table 3). The correlation between amount of sustained attention and amount of help needed was also significant within two of the three cultural backgrounds: Mayan children from traditional families, $r = -.38, p < .05$, and European American middle-class children, $r = -.44, p < .05$.

The cultural differences in how much help the children needed in Session 2 seem directly related to their extent of sustained attention in Session 1, as opposed to some other cultural difference (such as possible differences in dexterity). This was confirmed with an analysis of covariance (ANCOVA) with background as a fixed factor and amount of sustained attention as a covariate. The results indicated that sustained attention was a significant covariate in how much help the children received in making the frog, $F(1, 56) = 7.74, p < .01$, and after we controlled for sustained attention, background became a nonsignificant main effect, $F(2, 56) = 2.26, p = .125$.

The use of brief glances was not correlated at all with needing less help from the Toy Lady for children constructing either toy. In addition, statistical analysis found no gender differences in the results of Session 2.

Discussion

Children in all three communities spent some time keenly attending to an ongoing event that was not addressed to them in third-party attention. However, consistent with our expectations, Mayan children were more likely to engage in sustained attention to interactions that were not directed to them than were European American children from middle-class families. The Mayan children from both more traditional and highly schooled families spent the majority of their time segments attending in a sustained manner, whereas the European American children spent the majority of their time segments either not attending to the construction or glancing at it briefly and sporadically. The differences in the extent of third-party attention between the Mayan children from more traditional families and the European American children were especially pronounced. The Mayan children

from families that were more familiar with "Western" ways through extensive schooling and related experiences were intermediate between the other two backgrounds.

These results are consistent with the idea that children who grow up in a community in which they are expected to attend to ongoing events attend keenly even in situations when they are not directly addressed. This accords with research with indigenous Mexican children indicating that even when children were playing at a remove from adult work, they continued to monitor nearby adult activity for moments when their presence would be needed (de Haan, 1999; Gaskins, 2000).

When our participants engaged in sustained third-party attention, they learned from their observations, at least in constructing the frog. (With the mouse, enough information may have been contained in the construction materials for the children to proceed regardless of whether they watched or not.) Overall, the children who sustained attention to their sibling's construction of the frog needed less help to complete the toy themselves. Also, in keeping with the differences in sustained attention, the Mayan children from traditional families learned more about building the toy frog than did children from European American middle-class and Mayan families who were more involved in Western ways through extensive schooling and related experiences than the more traditional Mayan families.

Cultural Ways of Organizing Teaching and Learning: Integrated in Community Activities or Receiving Lessons

This study supports the idea of a common Indigenous-heritage North and Central American approach to learning (*intent community participation*; Rogoff et al., 2003) in which children are present and participate in the range of community activities, learning by keen observation. In the words of a North American indigenous grandfather, "the best way for them [children] to learn is to be there and to participate" (Romero, 2004, p. 217). Indeed, children from the Mayan traditional families were more often involved in productive work than were children from the other two communities and often showed sustained attention to information that was not addressed to them.

In attributing the findings to a common Indigenous-heritage North and Central American approach to learning, we cautiously generalize beyond our sample on the basis of ethnographic and comparative work in this region (Cazden & John, 1971; Chavajay & Rogoff, 1999; Collier, 1988; Correa-Chávez et al., 2005; Deyhle & Swisher, 1997; Rogoff et al., 1993, 2003; Stairs, 1991). The

Table 3
Average Amount (and Standard Deviations) of Help Children Needed To Construct Toy, With Respective Correlations

Help score/correlation	Mayan traditional	<i>Kaxlaan</i> Mayan	European American middle-class	All children
Children attempting to construct mouse by themselves				
Percentage (and <i>SD</i>) of maximum score of help from Toy Lady	33.5 (14.0)	30.5 (15.1)	31.7 (20.1)	31.7 (16.6)
Correlation (<i>r</i>) between help received and attention	-.11	.19	-.07	.01
Children attempting to construct frog by themselves				
Percentage (and <i>SD</i>) of maximum score of help from Toy Lady	43.5 (15.1) ^{a,b}	52.3 (13.9) ^a	58.8 (11.2) ^b	51.0 (14.8)
Correlation (<i>r</i>) between help received and attention	-.38 [*]	-.29	-.44 [*]	-.47 [*]

Note. In each row, superscripted letters indicate significant differences across cells with the same letter (according to planned contrasts).
^{*} $p < .05$.

pattern of third-party attention that we found has also recently been found among children whose families immigrated to the United States from indigenous regions of México. Mexican-heritage U.S. children, whose mothers had little experience in Western schooling and likely had more experience with Indigenous practices, observed more keenly than did Mexican-heritage U.S. children whose mothers had at least 12 years of Western schooling (Silva, Correa-Chávez, & Rogoff, 2008). A cultural emphasis on organizing children's learning through intent community participation may also occur in other parts of the world; future research is needed to determine how widespread is the cultural tradition emphasizing learning through intent community participation.

Our finding that European American middle-class children most often did not attend to third-party activity is consistent with the idea that children who grow up with adults often directing their attention may depend on direct instruction to pay attention. It also fits with Ellis and Gauvain's (1992) finding that when European American children were not directly involved in a game, they were more likely to be distracted than Navajo children.

Our finding that the European American middle-class children were more likely to try to disrupt the activity or to seek attention may also relate to experience in settings in which they are often addressed directly. It does not seem that they were attempting to be more involved in general, because there were no differences among backgrounds in how often the nonaddressed children attempted to collaborate in the construction. Rather, our findings are consistent with research showing that European American middle-class toddlers were more likely to interrupt ongoing activity when they were not centrally involved (Rogoff et al., 1993; Verhoef et al., 1999).

Children who spend extensive time in school and other activities designed by adults for children, such as tutoring, classes, and organized sports (Gutiérrez, Izquierdo, & Kremer-Sadlik, 2006; Morelli et al., 2003), may come to depend on adult management. Middle-class parents often attempt to manage children's attention by using a higher register, known-answer questions, and mock excitement (Dixon et al., 1984; Rogoff et al., 1993); teachers often try to manage children's attention, acting as "switchboard operators" (Philips, 1983). Dependence on adult management appears to be rare in communities in which children are included in the range of activities of the community and have the opportunity and responsibility to contribute (Jordan, 1989; Rogoff, 2003).

Schooling as Part of a Constellation of Aspects of Community Change and Continuity

Although the attention differences we found corresponded with differences in maternal schooling, it would be misleading to treat schooling by itself as responsible for the differences among the backgrounds. Rather, schooling is part of a constellation of aspects of family and community life that tend to accompany each other (Rogoff & Angelillo, 2002; Rogoff et al., 2005).

For example, the differences between the two Mayan backgrounds likely relate to the many differences between the two types of families in the extent to which mothers had experience in the Western institution of school. The families differed in the extent to which they used more traditional Mayan ways of organizing children's opportunities to learn—such as integrating children in productive work, with the chance to observe and participate. Families in which the mothers had extensive schooling were

less likely to speak Tz'utujil (and more likely to speak Spanish), had fewer children, had less traditional occupations, and were more likely to be Protestant (among other differences). These differences are not coincidental—the national language used in commerce and school is Spanish; literacy and knowledge of Spanish are important in the Protestant sects of Guatemala and in nontraditional occupations such as teacher and secretary; and schooling is correlated with lower birth rates and smaller family size (Chavajay & Rogoff, 2002; LeVine, 1987; LeVine & LeVine, 1998; LeVine & White, 1992; Rogoff et al., 2005).

Even though schooling should not be regarded as the sole "active ingredient," it seems likely that mothers' experience of schooling itself plays a role in children's attention. Mothers who spent 12 years in school may often model their interactions with children on school ways, either deliberately to foster school success or simply through habit. This may lead highly schooled Mayan mothers in San Pedro to engage in practices that are common in highly schooled families in the United States, such as treating toddlers as conversational peers and engaging them in lessons and directing older children as teachers often do (Chavajay & Rogoff, 2002; Rogoff et al., 1993).

As school becomes increasingly central in childhood in San Pedro, parents often attempt to prepare their children for success in school. As this study was being conducted, we were struck by the need to adjust schedules to accommodate some of the children's after-school lessons (e.g., typing, music, and art)—a new phenomenon in San Pedro.

The dominance of European American cultural institutions yields changes in communities like San Pedro along a number of fronts. Although it is not necessarily the case that *kaxlaan* (foreign) ways will replace more traditional ways in places like San Pedro, substitution of cultural practices may be common. However, we regard expanding repertoires of practice as more desirable than replacement (see Gutiérrez & Rogoff, 2003). An important empirical question is what circumstances promote expansion rather than substitution of practices.

Implications for Application

In addition to the implications of our study for future research in cultural variation in third-party attention, the study has some implications for practice, especially in schools. We suggest that schools should consider the attentional practices familiar to children from Indigenous and Indigenous-heritage American backgrounds, who may be likely to observe activities that are not specifically addressed to them without losing track of other activities. For example, they may monitor a classmate's work, and be ready to help, at the same time as they attend to their own schoolwork. This is supported by other research showing that Mexican-heritage U.S. children from families with little experience in school were more likely to offer unsolicited help to other children, and more likely to attend skillfully to several events at once, than were European-heritage and Mexican-heritage U.S. children whose mothers had extensive schooling (Correa-Chávez et al., 2005; Najafi, Mejía Arauz, & Rogoff, 2008). Children who engage in sustained third-party attention in U.S. schools may find themselves penalized due to their teachers' assumption that they are not attending to their own work, when they may in fact be skillfully attending to their work while at the same time monitoring or assisting a classmate.

In addition, children whose upbringing may not emphasize attention to events around them might benefit from learning how to attend to events that are not addressed to them. The organization of schooling and middle-class family life may often provide reduced opportunities for productive third-party attention. For example, although there are multiple people present in a classroom, school itself is usually organized as a dyadic interaction between children (or the class) and the teacher (Philips, 1983; Rogoff, Goodman Turkianis, & Bartlett, 2001). However, the need for collaboration in the workplace may call for attention to ongoing activities that are not directed to oneself.

We suggest that all children could benefit from more flexible organization of schooling itself. Instead of children having little opportunity to model their learning on the skills of their teachers or peers, schools could be more frequently organized to provide children such sources of information. Work in an innovative elementary school in Salt Lake City has demonstrated that it is possible to structure classroom learning in a way that allows children and teachers the opportunity to work with each other on meaningful projects in which children can learn from observing the work of others (Rogoff et al., 2001). It would be useful to consider ways in which classrooms might be structured to allow for and encourage more learning by attending to surrounding events to benefit children from all backgrounds.

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