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Cultural Patterns in Attending to Two Events at Once

Maricela Correa-Chávez, Barbara Rogoff, and Rebeca Mejía Arauz

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This study examined cultural differences in children's simultaneous attention to 2 events versus quick alternation in which attending to 1 event momentarily interrupted attending to another. Thirty-one 6- to 10-year-old U.S. children of Mexican and European American heritage folded paper figures with 2 other first- to third-grade children and an adult. Mexican heritage children whose mothers averaged 7 grades of school more commonly attended to events simultaneously. European heritage and Mexican heritage children whose mothers had more than 12 grades of school more commonly alternated attention. Differences are interpreted in light of traditional indigenous North and Central American emphasis on learning through observation of ongoing events as well as school practices that emphasize learning by attending to one event at a time.

This study examined how school-age children from three cultural communities managed their attention during a small-group demonstration of how to fold origami paper figures. We were interested in cultural differences in whether the children simultaneously and alertly attended to two ongoing events or focused on one event at a time, attending to multiple ongoing events in quick alternation. Our interest in these ways of managing attention stems from research indicating cultural variation in emphasis on learning by observing ongoing events.

Simultaneous Attention in Learning Through Observation

Ethnographic research in a number of indigenous North and Central American communities reveals that young children are expected to learn by keenly observing ongoing events (Deyhle & Swisher, 1997; Paradise, 1996; Romney & Romney, 1966). Children in traditional communities with historical roots in indigenous North and Central America often participate in the productive and social activities of their families, learning what to do by intently observing

ongoing events (Cazden & John, 1971; de Haan, 1999; Rogoff, Paradise, Mejía Arauz, Correa-Chávez, & Angelillo, 2003; Suina & Smolkin, 1994).

Learning through keen observation of ongoing events seems to be less emphasized for children in middle-class European American communities, who often have little opportunity to participate in the range of adult activities of their community. Instead, European American middle-class children are often involved with adults who attempt to manage the children's attention in structured child-focused learning situations (such as school) where children are not expected to monitor multiple ongoing activities but rather may be expected to focus on one event at a time (Morelli, Rogoff, & Angelillo, 2003; Rogoff, Mistry, Göncü, & Mosier, 1993).

Attention research has in general investigated this form of attention—focusing on one event at a time. Researchers have contrasted focused attention with “unfocused” attention and have argued that developing a focus on one activity at a time is beneficial to children (Ruff & Rothbart, 1996). This approach may reflect the practices of the researchers' highly schooled cultural communities. By the time European American children are of school age (6–8 years old) they believe that people can only pay attention to one thing at a time; younger European American children appear not to possess that folk knowledge (Flavell, Green, & Flavell, 1995).

However, the cultural research indicates that being focused on one event (or rapidly alternating between events) or being unfocused may not be the only alternatives. Another is simultaneous attention, in which people attend keenly and actively in a broad manner that focuses skillfully on several events at once.

Rebeca Mejía Arauz is now at ITESO University, Guadalajara, Mexico. Appreciative thanks to the families who participated in this study, to the teachers and principals of Starlight and Valencia Schools for facilitating the children's involvement, and especially to Noni Reis, Eileen Fuller, and Rocío Rivadeneyra for their valuable help. Thanks also to Nameera Akhtar, Ruth Paradise, Cathy Angelillo, Araceli Valle, Amy Dexter, and Pablo Chavajay for their comments. We are also grateful for support from the Ford Foundation to the first author, Sandra Basel Beck and the University of California, Santa Cruz Foundation Professorship in Psychology to the second author, and from CONACYT (Mexico) to the third author.

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Simultaneous attention may be important when learning relies on observation of ongoing events. It may be useful to timeshare attention to competing events to monitor the environment for opportunities to learn without interrupting the activity at hand. For example, among 2- to 3-year-olds in a Mayan community in the Yucatán,

a lot of energy is put toward understanding the moment-to-moment pulse of the compound. This kind of behavior is similar to that of the adults, who are careful observers and monitor village activity in the same way. The cultural goal is to know everything that is going on. . . . In a compound with many people and animals in it, there is almost always some activity going on, so such observation is almost always an option for the child, and frequently it is done in parallel with whatever else the child is doing, because one can lose track of what is going on if one does not pay close attention at all times. (Gaskins, 1999, p. 44)

Likewise, in a Guatemalan Mayan community, where children are integrated in the community and observation of ongoing events is prioritized as a means of learning, toddlers and mothers commonly attended simultaneously to two events at once, with neither event interrupting another. In contrast, middle-class European American toddlers and mothers more commonly alternated their attention, switching rapidly between one event and another, with involvement in each sustained but with one event momentarily placed on hold while interrupted by the other (Chavajay & Rogoff, 1999; Rogoff et al., 1993).

To our knowledge, the only studies that have systematically examined cultural variation in the use of simultaneous attention have involved Guatemalan Mayan and European American mothers and toddlers (Chavajay & Rogoff, 1999; Rogoff et al., 1993). The present study followed up on this work and extended it to examine whether simultaneous attention to ongoing events would also characterize the attention of young school-age children from families with MesoAmerican indigenous heritage a few generations removed: Mexican heritage families that have immigrated to the United States—primarily from rural areas of Michoacán and Jalisco where, as is common in rural México, many communities have historical indigenous roots. Ethnographic work in México, particularly in communities with indigenous heritage, has pointed to an emphasis on learning through observation (Cancian, 1964; Childs & Greenfield, 1980; deHaan, 1999; Maurer, 1977; Modiano, 1973; Paradise, 1996; Romney & Romney, 1966).

The idea that observation is less prevalent in European American middle-class settings is often implied in the ethnographic accounts but has seldom been examined. One study found that European heritage U.S. children more often requested further information beyond what was provided through observing a demonstration than did Mexican heritage U.S. children with limited family involvement in schooling (Mejía Arauz, Rogoff, & Paradise, 2003). The findings are consistent with the idea that these Mexican heritage children may be more familiar than European American middle-class children with learning situations in which they are expected to be keen observers of ongoing events.

We included European heritage children from families with a great deal of experience in schooling (mothers having more than 12 years of schooling). The restriction to highly schooled families is in keeping with the implicit comparisons with middle-class U.S. childrearing practices in the ethnographic literature. Furthermore, experience in school appears to be a key feature of the cultural experience of communities where this institution is central—part of the usual definition of *middle class*. We treat European American middle class as a cultural community, not simply as an interaction of ethnicity and social class, which would be at odds with our cultural approach focusing on the constellation of practices of this and other cultural communities. In the past, comparative studies that included middle-class children have often involved deficit models; we include this population not as a standard or norm but as a way to investigate the cultural nature of European American middle-class ways of attending.

Our primary analysis thus compares the attentional management of European heritage U.S. children and children from Mexican heritage families that have immigrated to the United States primarily from rural areas of Michoacán and Jalisco. We examined the hypothesis that Mexican heritage U.S. children whose families (with little schooling experience) have immigrated from locales with indigenous history will use more simultaneous attention than will European heritage U.S. children whose families have extensive school experience, who are expected to display more alternating attention, attending to one focus at a time in rapid alternation when there are competing events.

Mothers' Schooling as a Cultural Practice Related to Children's Ways of Learning

The role of schooling in cultural practices is supported by Mejía Arauz et al.'s (2003) finding that

Mexican heritage children whose mothers had more than 12 years of schooling resembled European heritage children whose mothers also had more than 12 years of schooling in requesting more information as they observed. Our secondary analysis adds Mexican heritage children whose mothers had more than 12 years of schooling. Their families may have experience both with the traditional organization of learning in indigenous Mexican communities of previous generations and with the organization of learning in schools. Mexican schooling practices have traditionally been based on U.S. and Western European models, which emphasize alternating attention. Hence, we believe that the mothers with 12 or more years of schooling would have wide experience with this particular form of attention.

Extensive participation in school by indigenous heritage mothers has been related to the ways mothers structure learning engagements for their children (Chavajay & Rogoff, 2002; Crago, Anahatak, & Ningiuruvik, 1993; Tapia-Urbe, Levine, & Levine, 1994). For example, Mayan mothers who had completed six to nine grades more often treated their children as if they were conversational peers and engaged them in language lessons, like middle-class European American mothers, whereas Mayan mothers who had zero to three grades were unlikely to do either (Rogoff et al., 1993). Similarly, differences between Chicana mothers, who more commonly used modeling as a teaching strategy, and European heritage mothers, who more commonly used questions and praise, were minimized when considering Chicana mothers who, like the European heritage mothers, had extensive schooling (Laosa, 1980, 1982).

Extensive experience in schooling is part of the constellation of middle-class cultural practices, given that having completed high school is part of the usual definition of *middle class*. Schooling is omnipresent in the lives of European heritage middle-class communities and has been for several generations in the United States; widespread mass schooling originated in the United States and Europe (Hernandez, 1997; Meyer, Ramirez, & Soysal, 1992; Rogoff, Correa-Chávez, & Navichoc Cotuc, in press). As of 1993, only 8% of U.S. White adults from the middle 60% of income had not completed high school. At least 80% of today's grandparental generation has completed high school, as has more than half of the great-grandparental generation (Bronfenbrenner, McClelland, Wethington, Moen, & Ceci, 1996, pp. 71, 232).

Reflections of many schooling practices can be seen in the ways middle-class parents engage with their young children, such as entering into child-

focused conversations and play, as well as language-teaching engagements and other preschool lessons (Haight & Miller, 1993; Harkness, 1977; Heath, 1982, 1983; Ochs & Schieffelin, 1984; Rogoff, 2003). These forms of engagement are rare in several communities in which schooling is less prevalent (Briggs, 1991; Fortes, 1938/1970; Jacobs, 1982; LeVine, 1990; Morelli et al., 2003; Valdés, 1996; Ward, 1971).

Our secondary, exploratory question thus examines the idea that there would be less use of simultaneous attention among Mexican heritage children whose mothers had more than 12 years of schooling than among those with relatively little maternal schooling. Past studies have found no correlation between the use of simultaneous attention and the amount of schooling of Guatemalan Mayan mothers (Chavajay & Rogoff, 1999; Rogoff et al., 1993). However, in both of the prior studies, the range of schooling was limited to 9 or 10 grades or fewer, and the authors speculated that with more schooling, differences might appear in attentional management. Differences in attention management according to maternal schooling would be consistent with the differences found in observation among Mexican heritage children whose mothers varied in their extent of experience of Western schooling (Mejía Arauz et al., 2003).

There was no principled question to prompt the inclusion of European heritage children with basic maternal schooling (who would also be difficult to find; all the available European heritage mothers had completed high school). The purpose of our primary analysis was to compare the constellation of practices of Mexican heritage children from communities with historical indigenous roots (and little Western schooling) and European heritage middle-class children to examine contrasts suggested by ethnographic reports. The secondary analysis extended this to investigate the role of Western schooling in the practices of a community with historical indigenous roots, to examine schooling experience as an aspect of cultural practice that may compete with experience in traditional community-based forms of learning that prioritize observation.

Method

Participants and Their Communities

Thirty-one triads of children ages 6 to 10 years folded two origami figures in a demonstration led by a bilingual adult. The children were from two California elementary schools serving similar populations, including primarily European American and

Mexican heritage children. Participants were recruited by sending permission slips and a short questionnaire home with the children. (Permission for children's participation was given by 69% of the parents in 11 classrooms.)

Each triad consisted of first- to third-grade children of the same cultural background and gender. By cultural background, we mean a constellation of features including both ethnic heritage (European or Mexican heritage) and family experience with Western schooling as indexed by mother's grades of schooling (more or less than the 12 grades needed to complete high school—a crucial juncture in schooling in both the United States and Mexico). Among the Mexican heritage children, there were 10 triads in which the 3 children had mothers with basic schooling (less than 12 grades) and 11 triads in which the 3 children had mothers with high schooling (12 grades or more). All of the mothers of the 10 triads of European heritage children had completed at least the 12 grades of high school, as is typical in European heritage middle-class communities. (Similar proportions of each background came from each of the two schools.)

Triads were employed to provide competing events as well as opportunities for the children to attend to other children. The number of children from each grade level was about the same for the three background groups. In each triad, children came from at least two different classrooms; the children in each triad were usually familiar but not close friends and this did not appear to differ across background groups.

Using the videotapes of the 31 triads of Mejía Arauz et al.'s (2003) study, we focused on the child who was seated between the other two, facing the camera, to ensure maximal visibility of the child's face to be able to code the child's attentional focus with confidence. (Mejía Arauz et al. had focused on

the youngest child because this child would be more likely to attempt to learn from observing older children folding their figures than vice versa.) The relative age (oldest, middle, youngest) of the child sitting in the middle was random and did not differ across the three backgrounds, and the age and grade differentials among the three children were similar across the three background groups.

The children were from a California town that has a high proportion of immigrants from Mexico who have arrived in the most recent generation or two from rural communities in the states of Jalisco and Michoacán, attracted by agricultural work. All the European heritage children were born in the United States. The majority of the Mexican heritage children were U.S.-born children of immigrants (7 of the children with maternal basic schooling and 8 of the children with maternal high schooling); four of the Mexican heritage children were immigrants themselves, and two families declined to state the child's place of birth. The basic-schooled mothers are likely to be the first generation in their family to attend school. (A study with parents living in Los Angeles who immigrated from the same regions of Mexico and who averaged 7 years of schooling like the basic-schooled mothers of our sample found that the grandparent generation averaged only 0.6 years of school; Reese, 2002.) It is likely that most of the Mexican heritage mothers with basic schooling had attended school in Mexico and that many of the Mexican heritage mothers with high schooling had attended U.S. schools. Table 1 shows the average years of maternal schooling for the focal children in each of the three background groups (reported on demographic questionnaires completed by the parents), the gender composition of the groups, and the age of the focal child.

Information on parental occupation was available for only about half of the children in each back-

Table 1
Maternal Schooling, Gender of Triads, and Age of Focal Child

Background	Average maternal schooling (range)	Gender of triads	Average age of focal child (age range)
Primary analysis			
Mexican heritage with maternal basic schooling	7.0 grades (range = 3–10)	5 girl triads 5 boy triads	7 years 8 months (range = 6;8–8;10)
European heritage with maternal high schooling	15.0 grades (range = 12–19)	6 girl triads 4 boy triads	8 years 0 months (range = 7;4–9;0)
Secondary analysis			
Mexican heritage with maternal high schooling	12.5 grades (range = 12–15)	7 girl triads 4 boy triads	8 years 1 month (range = 7;4–9;4)

ground group. Of those for whom data were available, the typical occupation for the Mexican heritage parents with basic schooling was fieldworker; most of the Mexican heritage parents with high schooling reported homemaker as their occupation; the European heritage parents reported occupations such as technician, manager, secretary, and researcher.

We do not assume that the patterns we are examining would necessarily apply to broader populations, such as to European Americans in general or to Mexican Americans in general. For example, our findings may or may not extend to Mexican heritage people who have been in the United States for several generations or who have emigrated from large cities rather than rural Mexico. Similarly, European American communities without an extensive history of schooling would likely engage in different traditions of teaching and learning than would our middle-class sample; therefore, so we would not generalize from our middle-class sample to all European Americans. The focus of our study is on characterizing patterns of cultural practices that may vary in prevalence in specific communities, not on characterizing national populations. We avoid assumptions of generality based on ethnic labels because this overlooks variations in cultural practices of communities with the same ethnic label but with differing cultural practices. We would want empirical information to support generalizing to communities that could differ in their practices despite having a historical link through ethnic origins. (Ethnic history is important but should not be treated as a static homogenous trait carried by individuals that exists independently of particular contexts and practices—hence, the necessity to consider experience with potentially changing cultural practices.)

Materials and Procedure

The children were videotaped while folding an easy origami pig and then a more complex origami jumping frog, averaging a total of 13 min for folding both figures. The origami demonstration was conducted by a bilingual European American first-grade teacher from one of the participating schools. (Her students did not participate in the study.) She was selected for her skill with children and because she participates comfortably and warmly in family events of Mexican heritage as well as of European heritage students. She was not aware of the questions of the study.

The children were asked if they would like to fold paper figures and were accompanied to a comfortable room in the school, decorated to look casual and



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

inviting, with posters on the walls and toys and cushions on the floor near the table. The session was conducted in English or Spanish, or both, depending on the language(s) the children spoke freely with each other and responded to more comfortably while a bilingual Mexican researcher accompanied them to the room where the study occurred. The Origami Lady sat facing the children who sat next to each other around the end of the table (see Figure 1). The Mexican researcher was also present, operating the video camera, which was placed at the opposite end of the table.

First, the children chatted and played with models of the paper figures with the Origami Lady for 3 to 4 min of warm-up to allow them to be comfortable in the setting and to establish a casual atmosphere. The Origami Lady then followed a script designed for demonstrating the folding of the paper figures with minimal explicit, lesson-like explanations, to make observing necessary for folding the figures as well as to avoid a teacher-talk approach (Paradise, Rogoff, Mejía Arauz, & Fuller, 2001). She was instructed to act as an “auntie” who was pleased to show the children how to fold these figures but did not require that they be attentive, as a teacher might during a lesson. The children folded their own figures as the Origami Lady demonstrated each fold in a manner that was loosely coordinated by the Origami Lady but that did not require all the children to be finished before she began the next fold. The children were encouraged to interact freely and help each other during the demonstration.

A procedural check verified that the Origami Lady followed the script, providing similar conditions for all triads (see Mejía Arauz et al., 2003). She used similar time for the three backgrounds (averaging 13 min 40 s, 13 min 30 s, and 13 min 28 s in the

Mexican heritage basic-schooling triads, Mexican heritage high-schooling triads, and European heritage high-schooling triads). In all triads, her warm-up seemed relaxed and she conversed with the children until they seemed comfortable. She did not differ in the frequency of requests for the children to help each other (in all but one triad she made two scripted requests to help each other, and in at least half of the triads for each background she made a third suggestion to help) or in the extent to which she provided access to model figures (she kept them in front of the children in 80% of the triads in all three backgrounds). She made sure the children oriented their papers correctly in nearly all of the triads and instructed them to crease their folds precisely (three to four times in almost all of the triads). No differences occurred in extent of teacher talk such as praising the children or controlling misbehavior, which were rare in all three backgrounds. The number of extra explanations the Origami Lady provided beyond those specified in the script did not differ nor did the number of scripted explanations that she left out or the extent of her pauses before proceeding to the next fold. The Origami Lady did not differ in the extent of her help; she 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. All in all, the Origami Lady's treatment of the triads of all three backgrounds was similar.

Attention Coding

Analysis focused on the folding of the frog figure, which took about 7 min. The frog was chosen because it was difficult for many children to fold (in contrast with the prior pig figure), and it was thus common for the children to seek information from multiple sources. The videotape record was divided into 10-s segments, during each of which coders identified the attentional patterns of the focal (middle) child. The average number of 10-s segments was 42 (range = 31–53); there were no differences in the number of segments between the backgrounds.

The coding scheme was adapted from attention management coding schemes used successfully in prior studies (Chavajay & Rogoff, 1999; Rogoff et al., 1993). Coding examined how children timeshared their attention to multiple events—attending to the Origami Lady's demonstration, their own or another child's folding, and unrelated conversations or play.

(As background information, we distinguished these foci of attention.)

Coding focused on the extent to which the focal child actively attended and kept two or more distinct skillful activities going at the same time, either by attending simultaneously or alternating quickly between events. To code either simultaneous or alternating attention, the coder had to be sure that both of the activities or events in which the child was engaged required skill or deliberate attention on the part of the child and were not just automatic movements. Engaging in simple or repetitive movements (such as absentmindedly tapping a hand on the table or shoving a paper aside) or completing an already started action (such as finishing a crease) were not included because it was assumed that these actions do not require much attention or skill for these children. Events that required skill or deliberate attention included making a tricky fold or other skilled action (one that would be a bit hard for a child with little origami experience), intent studying or monitoring of someone else's work, concentrating on a model figure sitting on the table, and conversing or responding to conversation about something other than what the child was doing at the time. (Conversation that was integrated with what the child was doing at the time was considered part of the same activity and thus was not coded as timesharing of attention.) Coders used timing and context information, direction of gaze, attentiveness of posture, skill in carrying out a complex action, responses to suggestions or conversation, and other indicators that a child was studying, monitoring, or seemed aware of events. Coding involved meticulous and repeated examination of the sequence of events in each segment.

Simultaneous attention. In simultaneous attention the child skillfully attended to two or more events with no pause or interruption in the flow of one activity for the sake of the other. Both activities were carried out at the same time, with each line of attention maintained as continuously as if there were no other focus. The following is a 10-s example of simultaneous attention:

A boy working on his own figure monitors the model in front of him, his own folding, and the folding of his neighbors. While the boy is working on his own fold his neighbor mumbles something. The boy continues folding as he glances at his neighbor's figure, and while continuing to work on his own figure he monitors his neighbor's progress and asks, "Need help?" When the neighbor answers "Yes," the boy takes the figure

and folds it while continuously looking at the model on the table. While this is going on, the other neighbor asks, "What's all this?" referring to the toys in the room. The boy continues to fold skillfully while scanning the room to see what his neighbor was talking about.

In this case there was no interruption in the folding or in observing; neither was temporarily stopped to work on the other, and the child did not stop folding to scan the room in response to his neighbor's question. Simultaneous attention often involved skillfully folding without interruption while looking intently and fluidly to another child's work, maintaining an attentive posture and extensively monitoring the Origami Lady's folding, or responding to extraneous conversation.

Alternating attention. In alternating attention, the child attended to two events, but with a momentary interruption in the flow of one activity for the sake of another, moving sequentially from one to the other and back quickly, keeping both going but with one temporarily placed on hold. There was a small perceivable break in one activity when the other was attended to. Nothing demanding happened in the event on hold while attention was directed to the other event, but both foci were kept active, without being finished or abandoned in the meantime. The following is a 10-s example of alternating attention:

A girl sits back with her hands on her lap, watching as the Origami Lady says, "Okay, you fold back this way." After the Origami Lady finishes demonstrating, the girl moves her hands above her figure as if to start. She looks down and her fingers start moving the paper around, but then she stops moving the paper and looks at the model. After verifying the fold she looks back at her own figure and continues her folding.

Not attending to two events. If the child did not keep two or more skillful activities going at the same time, coders indicated whether the children showed a simple shift of attention, seemed unaware of another interesting event, or no competing event called the child's attention during the 10-s segment.

"Shift of attention" was used for situations in which the child interrupted attention to one activity to turn his or her attention to something else without returning to the first activity, although the first activity appeared to be momentarily suspended with the possibility of returning to it. Shift is like the first part of an alternating attention episode but the child does not return to the first activity after attending

briefly to the second. The following is an example of shift of attention:

A boy is playing with a model frog by making it jump across the table when his neighbor makes a comment about a difficult fold. The boy responds by turning his head; meanwhile, his hand is poised above the frog, seemingly about to make it jump. However, rather than continuing to make the frog jump, he reaches for his friend's figure and engages in a conversation about the paper, and does not go back to making the model frog jump.

The boy could have continued playing with the model frog while also attending to his friend but he abandoned one to work on the other. (It would not be coded as a shift of attention if the boy had finished playing with the frog, sat for a moment, then reached for his friend's figure because this would involve no need to timeshare attention.)

"Apparently unaware" was used when the coder was convinced that the child was oblivious to an event of interest to him or her. During attention-grabbing or unusual events that the coder judged to be of likely interest to the child, the child appeared to be "in their own world," not paying attention, or focusing so intently on one thing that he or she did not realize that there was another event of interest. Only events that the coders judged "the child would under normal circumstances" want to pay attention to or acknowledge were included. The following is an example of apparently unaware:

A child was experiencing difficulties with a particular fold, but did not seem to realize that another child was offering to help. On previous occasions, the child had eagerly accepted the other child's offers of help.

Apparently unaware would not be coded if the child knew that help was being offered but refused to accept it or had a reason to ignore it, or if there was doubt about the child's interest in the second event. Routine background events were not considered potential events of interest.

"No need/no evidence" was used to code segments during which the child was not timesharing attention to two or more events, and the coders saw no apparent need to timeshare attention, or there was insufficient evidence to be sure that there were two competing foci of attention. For example, a child might focus only on her own folding while no other event of interest (such as demonstration) was going on. No second event compellingly called for the child's attention or offered an attractive competing focus.

Only one code was given for any 10-s segment. Because we did not want to miss occurrences of simultaneous attention, any segment involving simultaneous attention was coded as simultaneous even if another form of attention was also used in the segment. This produced a slightly higher overall level of simultaneous attention if children used simultaneous attention briefly, together with alternation. This coding approach is conservative in that it is likely to decrease slightly the likelihood of finding differences between the backgrounds in amount of simultaneous attention. However, preliminary informal coding in 5-s rather than 10-s segments (which would decrease the frequency of overlaps within segments) did not seem to change the pattern of results.

If a segment involved alternating attention (without any simultaneous attention), the segment was coded as alternating even if the segment also included a shift of attention or apparent unawareness of a competing event. Any segment that was not coded in any of the prior categories was coded as no need/no evidence.

Reliability. A fully bilingual (English/Spanish) Mexican heritage assistant unaware of the hypotheses of the study coded each of the 31 triads. The first author (also fully bilingual and of Mexican heritage) coded an overlapping 40% of the data for reliability purposes. The reliability between the two coders' judgments was assessed using Pearson correlations of the total number of segments employing each attentional strategy for each child, yielding coefficients as follows: number of time segments involving simultaneous attention ($r = .97$), alternating attention ($r = .96$), and attention shift ($r = .82$). Neither of the coders identified any segments as apparently unaware in any of the data coded for reliability purposes; this category was rare overall, as can be seen in Table 2. (Although our questions involved only the total use of each attentional strategy for each child, we also examined segment-by-segment agreement, which was also good.) With regard to what the children attended to when they attended simultaneously or in alternation, Pearson correlations were as follows for the totals of segments coded as employing simultaneous attention and alternating attention, respectively: child's own folding ($r_s = .99, .99$), Origami Lady ($r_s = .98, .96$), another child folding ($r_s = .92, .91$), conversation ($r_s = .53, .99$), models ($r_s = .70, .96$), and other objects in the room ($r_s = .51, .91$).

Results

Because the length of the folding procedure varied across triads, the data were analyzed using propor-

Table 2

Mean Percentage (and Standard Deviation) of Segments in which Children Used Different Forms of Attention Management

Form of attention management	Primary analysis				Secondary analysis	
	Mexican heritage basic schooling		European heritage high schooling		Mexican heritage high schooling	
Simultaneous	48.3	(7.9)	27.1	(9.7)	34.7	(11.0)
Alternating	37.7	(5.5)	53.3	(9.2)	48.2	(10.0)
Shift	1.0	(2.5)	2.2	(2.3)	2.4	(2.0)
Apparently unaware	0.0	(0.0)	0.0	(0.0)	0.4	(1.5)
No need/no evidence	13.0	(7.5)	17.3	(6.3)	14.2	(5.2)

tions of the total time segments. There were no significant differences among the three backgrounds in the proportion of time segments in which the children did not attend to two events—whether shifting their attention, seeming unaware of ongoing events, or attending only to one event with no need to attend to a competing event (see Table 2). There were almost no incidents of shifting attention or apparently unaware (partially because our coding scheme favored the two timesharing categories if either of them occurred). Hence, we focus on the two forms of timesharing: simultaneous and alternating. There were no differences in how often the children from the three backgrounds timeshared attention overall (using one or the other of the two forms of timesharing attention).

Because the primary analyses had clear predictions based on prior studies, we used one-tailed t tests to compare the proportion of time segments in which the children from our two primary comparison groups used simultaneous and alternating attention. We considered combining the primary and the secondary analyses in analyses of variance (ANOVAs) with all three background groups, but this would inappropriately mix predicted and exploratory analyses.

Primary Analysis: Mexican Heritage Basic Schooling and European Heritage High Schooling

As expected, the Mexican heritage children whose mothers had basic school experience used simultaneous attention in a higher proportion of time segments than did the European heritage children whose mothers had high schooling, $t(18) = 5.34$,

$p < .001$. On average, the Mexican heritage children whose mothers had basic schooling used simultaneous attention in 48% of the time segments compared with 27% for the European heritage children.

The European heritage children used alternating attention in a higher proportion of the time segments than did the Mexican heritage children whose mothers had basic schooling, $t(18) = 4.56$, $p < .001$. On average, the European heritage children used alternating attention in 53% of the time segments compared with 38% for the Mexican heritage children whose mothers had basic schooling.

Secondary Analysis: Mexican Heritage Children With Maternal High Schooling

On average, the Mexican heritage children with maternal high schooling used simultaneous attention at a rate that falls between the other two backgrounds (35% of the time segments). However, it appears closer to the rate of the European heritage children whose mothers also had high schooling (27%) than to the Mexican heritage children with maternal basic schooling (48%, see Table 2). Because no specific pattern was predicted for the Mexican heritage children whose mothers had high schooling, we analyzed the differences among the three backgrounds using a one-way ANOVA with post hoc Bonferroni correction, $F(2, 28) = 12.29$, $p < .01$. Post hoc tests revealed that the Mexican heritage children with maternal high schooling used simultaneous attention in a significantly smaller proportion of time segments than did the Mexican heritage children whose mothers had basic schooling ($p = .01$), and there was no difference between the Mexican heritage children whose mothers had high schooling and the European heritage children whose mothers had high schooling.

The rate of alternating attention used by the Mexican heritage children with maternal high schooling (averaging 48% of the time segments) also more closely resembled the rate of the European heritage children whose mothers had high schooling (53%) than the Mexican heritage children with maternal basic schooling (38%; see Figure 2 and Table 2). A one-way ANOVA indicated significant differences in the proportion of time segments in which the children of the three backgrounds alternated attention, $F(2, 28) = 8.71$, $p < .001$. Post hoc tests revealed that the Mexican heritage children with maternal high schooling used alternating attention in a higher proportion of time segments than did the Mexican heritage children with maternal basic schooling ($p < .001$), and there was no significant difference

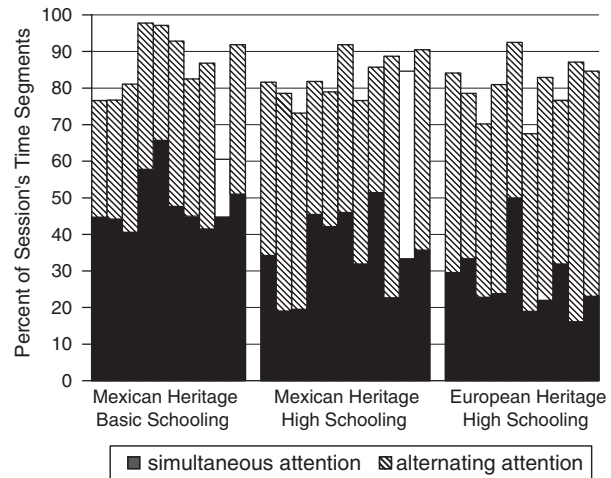


Figure 2. Case graph of the percentage of time segments that each child used alternating and simultaneous attention.

compared with the European heritage children with maternal high schooling.

We also examined maternal schooling as a continuous variable, looking at its correlation with use of simultaneous and alternating attention among the Mexican heritage children. The correlations were $r = -.44$ for maternal schooling with simultaneous attention and $r = .45$ with alternating attention, among the 21 Mexican heritage children ($ps < .05$). However, we note that schooling is not a continuous or linear variable; the cutoff point at 12th grade was used to distinguish the triads of the two background groups in part because it is a meaningful turning point, with consequences for employment. In addition, the distribution shows a hiatus among the Mexican heritage mothers, with schooling extending from grades 3 to 10 and then skipping to 12 or more grades completed. (For the European heritage children, no correlation would be expected, given the restricted range of schooling of their mothers; correlations were $r = .01$ for simultaneous and $r = -.32$ for alternating, both *ns*.)

Variability of Individual Children Within the Three Backgrounds

Figure 2 shows a case graph of the use of simultaneous and alternating attention by each child in the three backgrounds. Note that all children used both types of attention and that for the two backgrounds examined in our primary analysis the overall difference was accompanied by little within-group variability. Simultaneous attention was used in most of the time segments by 9 of the 10 Mexican heritage children whose mothers had basic schooling; the 1

remaining child used simultaneous and alternating attention in an equal number of segments. Alternating attention was used in most of the time segments by 9 of the 10 European heritage children with maternal high schooling; the 1 remaining child used simultaneous attention in slightly more time segments than alternating attention.

The Mexican heritage children whose mothers had high schooling showed greater variability. As a whole, they used simultaneous attention in a smaller proportion of time segments and alternated attention in a greater proportion of time segments than did the Mexican heritage children whose mothers had basic schooling. In this way they resembled the European heritage children whose mothers had a similar extent of schooling experience. Among the 11 children of this background, 7 used alternating attention in most of the time segments, 3 used simultaneous attention in most of the time segments, and 1 child used simultaneous and alternating attention equally. Thus, within this background, some individuals seemed to follow the pattern of their peers of similar ethnic heritage, although most seemed to resemble peers with similar maternal schooling.

To see whether there was a pattern in the variability of children of this background, we looked at demographic information for the 4 Mexican heritage children with maternal high schooling who used the most simultaneous attention and the 3 who used the least. With these small numbers, there were no obvious patterns distinguishing them by age, number of siblings, birth order, language spoken during the folding activity, or number of years of maternal schooling or of paternal schooling. The 4 who simultaneously attended the most were all girls, whereas the 3 who simultaneously attended the least were 2 boys and 1 girl; however, the small numbers make it hazardous to draw conclusions, and the other two backgrounds did not follow the same gender pattern. In the Mexican heritage group with maternal basic schooling, the children who simultaneously attended the most were boys, and no gender pattern appeared with the European heritage children. The variability among the Mexican heritage children with high maternal schooling may relate to this group being in the midst of rapid cultural transitions. We consider this idea in the Discussion.

What Did the Children Attend to When They Attended Simultaneously or in Alternation?

In simultaneous as well as alternating attention, in all groups, the focus of the children's timeshared attention was most commonly their own folding (in

an average of 92% of the time segments), the Origami Lady (71% of the segments), and another child (41% of the segments). Less common was attention to conversations (in an average of 2% of the segments), the model figures (6% of the segments), and other objects in the room (9% of the segments). Simultaneous attention mostly involved maintaining attention to one's own folding while also attending to the Origami Lady or to another child. Similarly, alternating attention mainly involved momentarily pausing attention to one's own work to attend to either the Origami Lady or another child.

There did not appear to be systematic differences in the focus of the triads' attention related to background or to the approach to timesharing attention. The only significant difference in focus of attention between the background groups was in the extent of attention to the model figures on the table, $F(2, 28) = 5.58, p < .01$. (There was greater attention to the model figures from the Mexican heritage children whose mothers had high schooling than from either the Mexican heritage children whose mothers had basic schooling or the European heritage children whose mothers had high schooling, averaging 10.6% vs. 4.1% and 2.6% of the segments, respectively, $SDs = 8.6, 4.5, 2.4, ps = .05$.)

The extent to which the children attended to these six foci did not appear to correlate systematically with the extent to which they attended simultaneously or alternated attention. There were no significant correlations for the sample taken as a whole, and only one significant correlation when the relationships were examined within each background separately. (Among the Mexican heritage children whose mothers had only basic schooling, those who used simultaneous attention more frequently also attended more frequently to conversation, $r = .78, p < .01$. This does not mean that they necessarily attended simultaneously to conversations—a question that our manner of coding does not permit us to analyze—but that those who did more of one also did more of the other.)

Is Use of Simultaneous Attention Related to Learning by Studious Observation?

We argue that simultaneous attention is an important aspect of learning through keen observation. Simultaneous attention would make it easier to notice interesting ongoing events without interrupting a primary activity. Hence, it is of interest to consider the correlation of our findings with unpublished data regarding the target children's studious observation of others' folding. Mejía Arauz et al. (2003)

had coded the youngest child in the group in the same videos and found that Mexican heritage children whose mothers had basic schooling more commonly observed the folding procedure without requesting further information, relying more on observation than the other children. (Coding of the middle-positioned children, who were the focus of the present study, was also done by Mejía Arauz, Rogoff, & Paradise, 1998, in unpublished data.) We examined the correlation of the proportion of folds in which the middle-positioned child observed without requesting further information with our coding of the percentage of time segments in which that child used simultaneous attention.

The children who more often used simultaneous attention tended to be the children who more often observed folding without requesting further information ($r = .30$, $p = .05$). (The children also simultaneously attended to other events that did not include folding in about 16% of their simultaneous attention segments, and at times their observation of folding did not involve a competing event to which they could timeshare their attention.) The correlation between extent of simultaneous attending and extent of observing others folding without requesting more information may support the idea that simultaneous attention is an aspect of learning through observing.

Discussion

Although all the children in the study used both simultaneous and alternating attention, there were notable differences associated with the children's background. The Mexican heritage children whose mothers had basic school experience used simultaneous attention to a greater extent than did the European heritage children whose mothers had extensive schooling experience. The Mexican heritage children attended simultaneously in most of the time segments, whereas European heritage children whose mothers had high schooling used alternating attention in most of the time segments. These results are consistent with previous research that found that Guatemalan Mayan toddlers and caregivers employed more simultaneous attention than did European American middle-class toddlers and caregivers, who more commonly employed alternating attention (Chavajay & Rogoff, 1999; Rogoff et al., 1993).

We found no differences in the extent to which the children shifted attention without returning to their first focus or seemed unaware of events that one would expect to interest them. These forms of attention rarely occurred, in part because our coding scheme prioritized coding timeshared attention (ei-

ther simultaneous or alternating) if it occurred within the 10-s segment. Prior studies of attention management (Chavajay & Rogoff, 1999; Rogoff et al., 1993) found higher rates of shifting attention or seeming unaware, but those studies sampled events rather than segmenting by time and hence did not need to make prioritization decisions. Those studies also occurred in less scripted, more populated settings with a greater variety of competing events (such as babies crying, phones ringing, and vendors calling out).

Our results are consistent with the suggestion of Chavajay and Rogoff (1999) that the idea that attention is limited to one channel because of fixed capacity or a "bottleneck" (e.g., Pashler, 1994) may reflect culturally specific attentional practices of European American middle-class people. However, under some conditions, such as with training in attending to several events at a time, U.S. university students and other adults also sometimes attend simultaneously to two activities at once (Hirst, Neisser, & Spelke, 1978; Sabers, Cushing, & Berliner, 1991; Schumacher et al., 2001). For example, young adults in the United States who received training in action video game playing that requires simultaneously juggling several varied tasks (such as detecting and tracking enemies and avoiding getting hurt) attended to more items at a time in a broader visual field and were less subject to attentional bottlenecks (Green & Bavelier, 2003).

It is possible that very close microanalysis of simultaneous attention (resembling the work of Wright, 1994, and Pylyshyn, 1996) might reveal extremely rapid alternation of attention, faster than we could detect in close analysis of videotapes. The cultural background difference would still be interesting because such micro-alternation would still be much more rapid than the approach used by the children who primarily alternated their attention in a manner visible on videotapes, with clear breaks evident at this scale. Research examining this possibility would further illuminate cultural variation in skillful timesharing of attention to complex events. Relatedly, it would also be of interest to examine the circumstances that might challenge people who are accustomed to using skilled simultaneous attention to narrow to a more exclusive focus on one event at a time.

Keen Attention as a Resource for Learning Through Observation of Community Events

Consistent with the idea that simultaneous attention could support learning through intent partici-

pation in ongoing community activities (Rogoff et al., 2003), we found that children who attended simultaneously in more time segments tended to be the children who more often observed the demonstration without requesting further information. This relation between attending simultaneously and observing a relevant activity may be even more marked in a situation with more ongoing events and less expectation that the children would focus on an adult's demonstration. As noted by Rogoff et al. (2003), in communities in which children have wide access to family and community activities, a great deal of children's observation includes events that are not directed toward them, such as adult conversation or work. In such settings, the likelihood of several relevant ongoing events would be increased, and the importance of simultaneous attention would be greater, as the events to learn from are not set up for children's attention. Rather, the children would learn by keeping their attention broadly and keenly focused so that they may be involved in their own work or play and at the same time notice when someone nearby begins to do something of interest or importance.

For example, Mazahua 9-year-olds (indigenous to Mexico) were alert to their parents' work at the same time as playing or watching other nearby events. They inferred from observing their parent's actions when they could afford to do something else momentarily while keeping an eye on the parent's activity and when their focus needed to include what the parent was doing in a more studious fashion. "When the parent started a new aspect of [a construction task] they would immediately come closer or pay more attention to make sure they would not miss anything" (de Haan, 1999, p. 143).

Most research on observation has focused on situations in which children watch events that are designed to instruct them. We expect that cultural differences in use of simultaneous attention would be especially important for learning through observing events that are not directed to oneself.

However, even in communities in which children have more restricted access to the range of family and community activities, children learn from observing events in which they are not directly addressed. For example, U.S. toddlers assess the character of a stranger by observing other people's reactions to the stranger (Feiring, Lewis, & Starr, 1983), and many U.S. children pick up vocabulary and aggressive ways of interaction from television (Bushman & Anderson, 2001; Huston & Wright, 1998). In learning vocabulary and appropriate use of language, middle-class U.S. children, like children in

several other communities, listen in on conversations that are not directed to them (Akhtar, Jipson, & Callanan, 2001; Barton & Tomasello, 1991; Ochs, 1988; Oshima-Takane, Goodz, & Deverensky, 1996; Schieffelin, 1991; Ward, 1971). It will be informative for further research to examine situations in ongoing events that are not designed for children as audience or for their instruction (Lewis & Feiring 1981; Rogoff et al., 2003); we are currently conducting a study of such circumstances.

In our research and the previous work of Rogoff and colleagues (Chavajay & Rogoff, 1999; Rogoff et al., 1993), the competing events have primarily involved social interaction. Individuals' (or communities') ways of timesharing attention to such social interaction may or may not resemble their ways of attending to mechanical events (such as monitoring several screens in an airplane cockpit or playing an action video game) or to other forms of social interaction (such as attending to the movements of other players in a soccer game or driving while talking on a cellular phone). Whether different forms of attention management are more suited to particular activities is an open question.

Experience in Western Schooling as Engagement With Specific Cultural Practices

We argue that by participating in the learning opportunities of their communities, children learn how to attend and learn in distinct cultural ways. In middle-class European American communities, children are often taught using didactic instructions to which they are expected to attend exclusively. For example, U.S. mothers took responsibility for making their toddlers learn a task by trying to arouse interest and refocusing the children, whereas Gusii (Kenyan) mothers seemed to expect toddlers to be able to take responsibility for completing the task as shown (Dixon, LeVine, Richman, & Brazelton, 1984). Controlling children's attention to teach them contrasts with the indigenous community-based learning tradition of structuring engagements in such a way that allows children to observe and contribute to ongoing activities (Gaskins, 1999; Paradise, 1996; Rogoff et al., 1993).

As a group, the Mexican heritage children whose mothers had extensive schooling managed their attention like the European heritage children whose mothers also had extensive school experience. These findings are consistent with research that has shown that indigenous and Mexican heritage mothers with greater experience with Western school engage with children in more school-like ways than their more

traditional counterparts (Chavajay & Rogoff, 2002; Crago et al., 1993; Laosa, 1980, 1982; Moreno, 2000).

Previous studies that examined Guatemalan Mayan mothers' use of simultaneous attention did not find any correlation with their amount of schooling (Chavajay & Rogoff, 1999; Rogoff et al., 1993). However, the present study focused on the relation of maternal schooling to children's attentional management, not the mothers' own attentional management, and included Mexican children whose mothers had more years of schooling. A small amount of school experience may be enough to encourage former students, when they become mothers, to engage in school-like ways of talking with children (such as providing vocabulary lessons and praise). In contrast, simultaneous attention may be a resilient cultural practice that is reduced only with greater experience with the formats of schooling, especially the one-focus-at-a-time arrangement in which the teacher directs students to limit their focus to one thing at a time, acting as "switchboard operator" (Philips, 1983).

The fact that some of the Mexican heritage children whose mothers had high schooling used attentional management similar to the Mexican heritage children whose mothers had only basic schooling, and others resembled the European heritage children whose mothers had high schooling, supports the idea that this may be a transitional group in the midst of a generational shift. Research with immigrant Mexican families has begun to demonstrate the kind of cultural shifts that some families engage in as they select some practices of their new country, maintain other practices of their ancestral community, and create new practices as they meet the challenges and opportunities of their generation (Delgado-Gaitán, 1994).

Of course, along with greater experience of schooling come other related practices that may also be more likely in a later generation in a family's or community's history. Our finding that schooling experience is associated with attentional patterns should be interpreted in light of the constellation of features that are associated with extensive experience in Western schools. Although what happens in classrooms may be key to the differences we have reported, people with extensive schooling differ in many other ways from those who follow a pattern of life closer to traditional indigenous ways (Rogoff et al., in press). The two Mexican heritage groups likely differ in terms of recency of immigration to the U.S., parental occupations, fluency in English and in Spanish, literacy, family size, involvement with extended family, extent of experience in Mexico, and

many values and practices associated with these. Hence, we interpret the differences between children of Mexican heritage whose mothers differ in experience in Western schooling as an indication of differences in a whole constellation of cultural practices—of which schooling may be a central one—rather than the effects of an isolated variable (see Rogoff & Angelillo, 2002).

The Mexican heritage children whose mothers averaged 7 years of schooling may experience some friction between their home expectations to attend broadly and school expectations to attend to one thing at a time. However, many of them will likely learn the ways of both cultural institutions. We believe it would also be useful for children whose home forms of attention match those of the school to develop facility in multiple ways of interacting, especially now that technology and work expectations make the skills of simultaneous attention especially valuable. For example, the classroom teaching often relies heavily on attending to several foci at once (Kounin, 1983; Merritt, 1982; Sabers et al., 1991). We agree with Bateson's (1994) suggestion: "Ideally, each individual would cultivate a repertoire of styles of attention, appropriate to different situations, and would learn how to embed activities and types of attention one within another" (p. 97).

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