

Cultural Variation in Management of Attention by Children and Their Caregivers

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Cultural variation occurred in time-sharing of attention during videotaped home visits with sixteen 14–20-month-old toddlers and their caregivers from a Guatemalan Mayan community and a middle-class community of U.S. European-descent families. The Mayan caregivers and their toddlers were more likely to attend simultaneously to spontaneously occurring competing events than were the U.S. caregivers and their toddlers, who were more likely to alternate their attention between competing events and, in the case of the caregivers, to focus attention on one event at a time. This cultural contrast in prevalence of simultaneous or nonsimultaneous attention occurred in both a 10-min segment of child-focused activities and a 10-min segment of adult-focused activities, replicating and extending the findings of B. Rogoff, J. Mistry, A. Göncü, and C. Mosier (1993), which implicated cultural processes in attention.

This study examined cultural variations in how caregivers and their toddlers manage their own attention to competing events in social interactions. It examined simultaneous attention to several ongoing events, alternating attention, and attention to one event at a time in a Guatemalan Mayan community and a middle-class community of U.S. European-descent families.

According to sociocultural theory, voluntary attention develops in specific cultural and institutional contexts through engagement in cultural activities with more competent community members (Laboratory of Comparative Human Cognition, 1983; Rogoff, 1990; Vygotsky, 1978; Wertsch, 1985). Consistent with this perspective, scholars working in a variety of communities have pointed to different ways of attending and of encouraging infants and children to attend (Bornstein, Azuma, Tamis-LeMonda, & Ogino, 1990; Bornstein, Maital, Tal, & Baras, 1995; Bornstein, Tamis-LeMonda, Pecheux, & Rahn, 1991; Goffman, 1963; Heath, 1989; Ochs & Schieffelin, 1984; Philips, 1983; Stairs & Kozolanka, 1997).

More specifically, there have been suggestions of cultural differences in how people manage their attention when there are several possible foci of attention (Hall, 1959). Henry (1955) sug-

gested that there are societal differences in sensitivity to signals from many ongoing sources that call for awareness on several levels simultaneously; he tied his speculation to ethnographic observations of communities in which children are involved in a complex social community with multiple relationships. Similarly, Ochs (1988) attributed the attentional skills of Samoan transcribers of audiotapes—who were able to follow simultaneous speech of three or four people talking in different areas of a living space—to their early socialization, in which as children they were expected to watch and listen to what was happening around them. Ochs reported that Samoan children early in life are able to monitor others' conversations while carrying out their own.

Bateson (1994) suggested that in the "modern world," the emphasis has become one of needing to focus and resist distraction. However, she argued for the importance of developing an ability to attend to more than one thing at a time as well, pointing out the need for "peripheral" attention in leadership roles and citing the way that Napoleon and Churchill "could attend to multiple tasks and conversations at the same time" (p. 101).

To our knowledge, there has been only one systematic study comparing the management of attention to co-occurring competing events in varying cultural communities. Rogoff, Mistry, Göncü, and Mosier (1993) observed toddlers operating novel objects presented by their mothers in a group conversation involving family members and visitors in their homes. They found that Guatemalan Mayan toddlers ages 12–24 months were more likely to attend to several events simultaneously—with each line of attention maintained as smoothly as if there were no other focus—than were middle-class U.S. toddlers. The middle-class U.S. toddlers generally attended to one event at a time, either by alternating attention between the two events or by focusing exclusively on one event, and were more likely to appear unaware of ongoing events than were the Mayan toddlers. The caregivers' attentional patterns followed the same patterns as did the toddlers. It was striking that the Mayan toddlers, ages 12 to 24 months, more frequently attended simultaneously to several events than did the middle-class U.S. caregivers.

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Portions of this article were presented at the meeting of the Society for Research in Child Development, Indianapolis, Indiana, in March 1995. This research was supported by grants from the Spencer Foundation and the Pacific Rim Foundation.

We thank Christine Mosier for her generosity in allowing us to use the data, gathered initially to examine infants' roles in their families (Mosier, Rogoff, & Chavajay, 1992). We are grateful to Marta Navichoc and Cindy White for their assistance in coding; to Nameera Akhtar, Cathy Angelillo, Margarita Azmitia, Bruce Bridgeman, and Muffie Wiebe for their helpful comments on the manuscript; to David Harrington for statistical advice; and to the research participants, who made this study possible.

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An example of *simultaneous attention* was provided by a 12-month-old Mayan child who attended to three events at once: He skillfully closed things in a jar with his older sister, whistled on his toy whistle that his mother had mischievously slipped into his mouth, and at the same time watched a passing truck with interest (Rogoff et al., 1993).

An example of *alternating attention* to ongoing events by a middle-class U.S. mother and child is provided by an interaction in which 21-month-old Sandy tried to involve his mother with a plastic jar with a peewee doll inside while she conversed with the interviewer.

Sandy tried to reach the jar (with a round knob on the lid). He pointed and said "want ball," reached and said "Ball," then grunted, saying "Ball, ball" and finally stretched and barely reached it. His mother eventually saw what he was doing and stopped talking with the interviewer.

She proceeded to interact with Sandy exclusively, picking up the jar, "What is that?" . . .

Sandy became distracted as the camera operator moved the camera, and he too exhibited a focus on one event at a time, as he turned around and watched the camera operator.

At this, the adult conversation resumed. . . . Sandy alternated his attention between the camera operator and his play. His mother finished talking with the interviewer and looked down to see Sandy playing with the Play-Doh. "Oh, it's a pancake!" she chirped, "Wanna put it in there?" moving into a child-focused moment of attention and shared action.

The interviewer asked a question, and the mother resumed attending to the interviewer. (Rogoff et al., 1993, p. 98)

A large body of research has focused on examining capacities and limitations in performing two tasks at the same time or attending to two stimuli at once in laboratory studies using very simple competing stimuli with people of middle-class European American backgrounds (e.g., Osman & Moore, 1993; Posner, Snyder, & Davidson, 1980; Schneider & Shiffrin, 1977; Welford, 1952). In this attention literature, it is commonly assumed that simultaneous attention to different events is limited by a "bottle-neck" in which performance on one or both tasks is "delayed" or "impaired" or by capacity limitations that require dividing attention so that neither task receives full mental capacity or the tasks interfere with each other if they are similar (Kahneman, 1973; Pashler, 1992, 1994). However, a few scholars have criticized the claim of fixed-capacity models (Neisser, Hirst, & Spelke, 1981). These researchers observed individuals skillfully attending to and comprehending several sources of information at once: learning to copy a list of dictated single words or sentences while simultaneously reading short stories and encyclopedia articles (Hirst, Neisser, & Spelke, 1978).

The literature's emphasis on focusing on one event at a time may reflect attentional preferences of the cultural community of the researchers and research participants. The ethnographic observations and Rogoff et al.'s (1993) systematic cultural comparison suggest that there may be substantial differences in how people of different communities approach the situation of having multiple potential foci of attention. Fixed-capacity models may reflect culturally specific attentional practices of European American middle-class people.

Given the importance of the findings of cultural variation in the use of simultaneous attending, the present study tested and extended Rogoff et al.'s (1993) findings with different families in the same two communities: the Mayan community of San Pedro, Guatemala, and a U.S. European American middle-class community of Salt Lake City, Utah. This study, using the same procedure with minor variations noted below, attempts to replicate the finding that San Pedro caregivers and toddlers attended simultaneously to competing events more commonly than did Salt Lake caregivers and toddlers, with simultaneous attention to competing events by San Pedro *toddlers* being greater than that shown by Salt Lake *caregivers*. Replication of these patterns would lend support to the idea that attentional processes develop in the context of their use in sociocultural activities.

The present study extends Rogoff et al.'s (1993) findings in several ways that are intended to provide an understanding of the basis of differences in attentional patterns: It examined (a) situational generality of the patterns and the possibilities that the patterns can be attributed to differences in the frequency of competing events, (b) the role of practice sharing attention among multiple children, and (c) the mothers' level of participation in Western formal schooling. The study also adds a methodological refinement to the coding of attentional strategy. The five extensions are explained below.

Extension 1. Our study investigated situational generality of the differences in attentional patterns by examining whether the differences appeared when families engage in child-focused or adult-focused activities. In Rogoff et al. (1993), results were primarily based on observations of events in which the children were the focus of the family's attention; exploratory analysis of an event in which the children were not the focus of the group's attention suggested that the same patterns held for both circumstances. The present study systematically examined this suggestion. In addition to examining attentional patterns in a 10-min segment in which the group members focused primarily on aiding the toddler's exploration of novel objects, we examined a 10-min segment focused on adult activities, in which the group was involved primarily in adult conversation; interactions with the toddler also occurred in the background.

Extension 2. The present study examined differences between the communities in the number of episodes involving competing events in order to investigate whether the more frequent simultaneous attention observed in San Pedro was related to the greater availability of competing events, which may have provided greater opportunities to practice attending simultaneously. The number of episodes involving competing events was controlled for but not analyzed in the Rogoff et al. (1993) study, by having coders rate the prevalence of each attentional strategy while taking into account the rough number of competing events.

Extension 3. The present study involved observations of toddlers with a 3-5-year-old sibling in order to rule out the possibility that differences in attentional strategies could be due to differences in families having single or firstborn children. In the Rogoff et al. (1993) study, as in most cultural studies, there was not an attempt to control for all the dimensions on which the families of these two communities varied. Cultural communities are characterized by a constellation of shared practices, traditions, values, and material circumstances that warrant distinguishing communities in terms of their cultural heritage. (This is quite different from treating culture

as a univariate factor, as is sometimes done with categorizations of individuals by race or ethnicity or treating communities as representatives of whole nations or "subcultures.")

In a domain in which very little research on cultural processes has occurred—as with cultural aspects of attention management—the first step is to establish that there are interesting cultural differences in the phenomenon before exploring further to examine which aspects of the cultural constellations contribute. It would be contrary to this purpose to try to choose communities that "control" for all variables except one or two in early phases of research. The present study contributes to substantiating that the extent of simultaneous and nonsimultaneous attention to competing events varies systematically across two cultural communities¹—building on the findings of Rogoff et al. (1993)—and extends the work to begin to focus on contributors to the differences.

Family constellations are one aspect of cultural practices that could relate to attention management. In the Rogoff et al. (1993) study, the Salt Lake sample included more single-child families and more firstborn children than did the San Pedro sample. Individual mothers with more than one child (and their children) may have greater opportunities to practice attending simultaneously, because of more frequent competing events, than mothers with only one child (and their children). Thus, individuals' greater practice attending to competing events could underlie the finding of greater use of simultaneous attending in San Pedro. This would not account for the observed differences in the Rogoff et al. study, because the number of competing events during the observation period was controlled for in the analyses, but it could be a means by which San Pedro caregivers and toddlers learn to attend simultaneously.

If the attentional differences were due to the individual mothers' experience (based on the number of children she is responsible for), the differences would thus be based on specific family circumstances rather than on community cultural practices. Thus we did not expect the greater frequency of simultaneous attending in the San Pedro families to disappear when participants were limited to families of at least two children. Our expectation was that although communitywide cultural practices based on family size might contribute to simultaneous attending by members of the community, differences in specific families' constellations would not fully account for the patterns observed by Rogoff et al. (1993), and thus the community differences would remain when the families sampled had similar constellations.

Extension 4. The present study also examined whether the pattern of attention varies with the mothers' participation in Western formal schooling. The middle-class mothers of Salt Lake have a high level of formal schooling by worldwide standards: The usual definition of middle-class status includes an advanced level of schooling (at least graduation from high school or completion of some college). In San Pedro, the average extent of schooling is much less and is quite variable, as schooling is a recent adoption of a Western practice. At the time of this study, the highest level of schooling available in San Pedro was ninth grade. Many mothers had not gone to school at all, but an increasing number of children attend school for many years. This raises the question of whether those San Pedro mothers with years of participation in the Western institution of schooling would show patterns of attention resembling those of the Salt Lake mothers.

In the study by Rogoff et al. (1993), the level of maternal schooling in San Pedro (ranging from 0 to 9 years) did not appear to relate to attentional patterns. The low correlation may be attributable to the small sample size; however, the sample was large enough to show strong correlations of schooling with the extent to which mothers used some school-like means of communication with their toddlers (greater amount of talk, explanation, language lessons, and treating children as conversational peers). On the basis of these findings, Rogoff et al. suggested that the levels of formal schooling achieved by this generation in San Pedro may have little impact on attentional patterns (though they relate strongly to school-like discourse practices), suggesting that attentional management may be a relatively resilient cultural practice. Because the sample size of our study is small, nonsignificant differences would have to be regarded as only tentative additional support for the idea that this degree of participation in formal schooling is not sufficient to change what may be relatively resilient cultural practices for the use of attention.

Extension 5. The present study also added a methodological refinement to the coding of attentional strategies. Our study added a fourth category of attention management—shifting attention from one event to another without returning to the first event—to the three patterns of attention management identified in Rogoff et al.'s (1993) study: (a) simultaneous attention to competing events without interrupting the flow of involvement in either event, (b) alternating attention with a back-and-forth sequence to focus on one event while momentarily interrupting attention to another event, and (c) appearing to be unaware of competing events. Shifting attention was expected to be more frequent in the Salt Lake families on the basis of informal observations and on the similarity of shift of attention to the other patterns of attending to one event at a time (alternating and unaware).

In summary, we expected that within both child-focused and adult-focused activities, San Pedro Mayan toddlers and their caregivers would more frequently attend simultaneously to competing events, whereas middle-class European American Salt Lake toddlers and their caregivers would more frequently alternate their attention between competing events, appear unaware of competing events, and shift their attention from one event to another without coming back to attend to the original event. The attentional patterns identified in the Rogoff et al. (1993) study were expected to be replicated with families that all have a 3–5-year-old in addition to the toddler, whether or not number of competing events (which might vary across communities) were considered in the analyses, and regardless of years of schooling of San Pedro caregivers.

Method

Participants included 16 families from each of two communities: Mayan families of San Pedro La Laguna, Sololá, Guatemala, and European-descent middle-class families of Salt Lake City, Utah. Toddlers (14–20

¹ We are not trying to generalize findings from the two communities to their nations or ethnicities; our study uses variation across two quite different local communities to break ground in examining the relation of cultural processes and attentional strategies. It is an empirical question (for other studies) if one wants to see the extent to which the patterns that we are beginning to identify are characteristic of the nations (or ethnicities) of these particular communities.

months), their 3–5-year-old siblings, and their caregivers were observed in social interactions involving novel objects in a structured interview and play situation in videotaped home visits. Half of the toddlers in each community were girls and half were boys, and the gender of the 3–5-year-old siblings was matched between communities with 5 boy–boy, 5 girl–girl, 3 boy–girl, and 3 girl–boy pairs. The videotaped data were originally collected by a native of the United States and research assistants from each of the communities; further data on schooling in San Pedro was collected by Pablo Chavajay, a native of San Pedro. Both authors are familiar with each community and speak the languages of each.

San Pedro families were recruited through word-of-mouth invitations by a native research assistant who explained the nature of the study; most had relatives who had participated in previous studies conducted by Barbara Rogoff. Salt Lake families were recruited through acquaintances, previous participation in another study, letters inviting participation, and word-of-mouth invitation.

Community and Family Background

The two communities vary on many dimensions, as is the case in comparisons of cultural communities, which necessarily involve multiple systematic variations among groups. The two communities represent different means of subsistence, daily routines, family roles, and participation in Western institutions such as schooling, religions, and other community practices and traditions. Here we give a brief characterization of the two communities and samples.

San Pedro sample. San Pedro La Laguna is a rapidly modernizing Tz'utuhil Mayan town of 8,000 in the highlands of Guatemala where, until recently, subsistence was based on family agriculture and formal schooling was not prevalent. Now there are many merchants and some professionals; the town has telephones, health centers, and television; and most children attend school (many continuing through sixth or ninth grade and some to university). Twenty years before (when electricity became available), three fourths of the children attended school, and most of these attended only through about third grade after 2 to 3 years in a preliminary grade in which Spanish, the language of the school, was taught (Rogoff, 1981); many of the mothers had not attended school and spoke only the native Mayan language.

In our sample, San Pedro mothers' schooling ranged from 0 to 10 years ($M = 3.0$); 5 had no formal schooling, 3 had 1 year, 2 had 3 years, 2 had 4 years, and 4 had 6–10 years. Fathers' formal schooling ranged from 0 to 12 years ($M = 5.4$). Of the 16 families, 9 had no school-age children; the remaining 7 had at least one child in school. All San Pedro mothers were homemakers. Fathers' occupations included baker, fisherman, police, farm worker, schoolteacher, nurse, truck driver, merchant, and stonemason. There were 10 Catholic and 6 Protestant families.

San Pedro is a compact town where most residents marry others from the same town. Most families of the present study were living close to relatives in the same neighborhood and shared the same patio and streets. Six of the households involved extended families, and the remaining 10 were nuclear families. Children in general share a room and bed with their siblings; toddlers sleep with their mothers. San Pedro children observe and participate in everyday community activities from earliest childhood (Morelli, Rogoff, & Angelillo, 1992; Rogoff, 1981).

The 14–20-month-old San Pedro toddlers had a mean age of 17.0 months, and their 3–5-year-old siblings' average age was 4.2 years. Mothers ranged in age from 19 to 37 years ($M = 27$); fathers ranged in age from 21 to 40 years ($M = 30$). The number of children per family ranged from 2 to 6 ($M = 3.1$). There were 9 second-born toddlers, 2 third born, 1 fourth born, 2 fifth born, and 2 sixth born.

Salt Lake City sample. This sample consisted of middle-class families of European descent in a U.S. city of 500,000, where subsistence for several generations has been based on paid work that requires many years of schooling. In our sample, the Salt Lake mothers' level of schooling

ranged from 12 to 18 years ($M = 15.6$). Fathers' formal schooling ranged from 14 to 19 years ($M = 16.8$). Almost half of the toddlers attended out-of-home day care, usually part time, and all older siblings attended preschool or school. The Salt Lake mothers' occupations included homemaker (7), accountant, teacher, social worker (2), salesperson, news reporter, and receptionist. Fathers' occupations included accountant, bus driver, meteorologist, chemical engineer, real estate broker, architect, auto mechanic, attorney, chef, nurse, vocational rehabilitation counselor, and doctor. Among the families, 12 were Latter Day Saints, 2 were Catholic, 1 was Jewish, and 1 family had no church affiliation.

Children live in households that usually contain nuclear families with only parents and children residing together; extended family seldom live in the same neighborhood. In our sample, all families were nuclear with both parents living together. Most families live in single-family dwellings with many appliances and a private yard. Children generally have a room of their own and are often segregated from adult activities day and night (Morelli et al., 1992).

The 14–20-month-old Salt Lake toddlers had a mean age of 17.1 months and their 3–5-year-old siblings' average age was 4.2 years. Mothers ranged in age from 26 to 40 years ($M = 32$); fathers ranged in age from 27 to 49 years ($M = 34$). The number of children per family ranged from 2 to 7 ($M = 2.6$). There were 10 second-born children; 5 third-born children; and 1 seventh-born child.

Procedure

In videotaped home visits lasting approximately 1.5 hr, mothers were interviewed regarding their child-care practices and demographic information. In the middle of the interview, the interviewer gave novel objects to the caregiver one at a time and asked her to get the toddler to operate them (an embroidery hoop, a pencil box, a nesting doll, a jar with doll inside, a jumping-jack puppet, a stick puppet, a videotape case, a baby doll, and play dough). In each of these visits, at least five people were present (mother, toddler, the 3–5-year-old sibling, and two visitors [the interviewer and the camera operator]). Other household members such as other siblings or grandparents were also sometimes present, especially in San Pedro.

Coding

Coding focused on two separate segments. During the child-focused segment, the toddler was the focus of the caregiver's attention as objects were presented for the toddler to operate. During the adult-focused segment, the caregiver was involved primarily in adult conversation with the interviewer and others present; the child was also present, often continuing play with the objects. Coding of the child-focused segment began 5 min after the first novel object was presented (to allow time for the participants to become familiar with the presentation of novel objects) and continued for 10 min. Coding of the adult-focused segment began when the interviewer resumed the interview with the caregiver following the conclusion of the presentation of novel objects and continued for 10 min.

Coding of each segment occurred in two passes through the videotaped data, one focusing on the toddler and the other focusing on the mother. The attentional management of the caregiver and toddler was coded in terms of whether each simultaneously time-shared their attention between events, alternated their attention, appeared unaware of competing events, or shifted their attention from one event to another without going back to the original focus of attention. The definitions of the attentional management codes were elaborated from Rogoff et al. (1993).

Identifying Episodes Involving Competing Events

The unit of analysis was each episode that involved two or more competing events occurring at the same time that the coder would expect to have attracted the target person's attention. That is, coders focused on

competing events that one might expect the person to monitor or to acknowledge, not just ongoing events that it would be strange for this person to attend or reply to (such as routine events in this setting or events that they would try to ignore).

Competing events included bids for the person's attention away from the focus at hand (as when a toddler is manipulating an object with the mother and is asked by the older sibling to play with another object). In such cases, coders had to judge whether the person would ordinarily respond to such a bid, often on the basis of that person's responses to other similar events when there was not something competing immediately for his or her attention. Competing events also included unrelated ongoing events that an alert person would be expected to monitor (such as the ring of a telephone for the Salt Lake mothers). Coders needed to judge whether particular events would ordinarily have been of interest or would ordinarily have been treated as background for the individual observed (such as airplane noises for Salt Lake families, with an international airport nearby).

Competing events could also involve spontaneous management of attention to competing foci (such as a mother responding to a street vendor at the same time as helping the toddler with an object). If an individual engaged in two activities at once, the coder had to be convinced that involvement with each focus was skilled, not automatic or so practiced that attentional demands were minimal (see Posner, 1982; Ruff & Rothbart, 1996; Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977). For example, if a mother had been patting an infant's back for some time when she began to help the toddler with an object, this was not considered a competing event for these experienced mothers because continuing to pat was judged not to require continuing skilled attention through the time that the mother helped the toddler.

For examining the caregiver's attentional patterns, we added a limitation to simplify coding. Only competing events that involved the toddler in one of the events were the focus of coding. (Competing events that did not involve the toddler were frequently off-camera.) For example, the caregiver's pattern of attention was coded if an unusually noisy truck passed by while the toddler tugged on the caregiver's sleeve, but not if the truck passed by while the caregiver conversed with the interviewer, because neither competing event involved the toddler.

Attentional Management

In each episode, only one type of attentional management was coded: simultaneous attention, alternating attention, shift of attention, or appearing unaware of competing events.

Simultaneous attentional time-sharing involves uninterrupted attention to several activities occurring at the same time. It does not necessarily involve simultaneous action, but it involves simultaneous attention, which could be indicated by a reply, by carrying out a suggestion, or by brief monitoring (e.g., a mother converses with the interviewer at the same time as assisting her child with an object; a toddler works the pencil box with her mother while interacting with her older sibling). In simultaneous attending, the flow of each activity is uninterrupted by the other, with each line of attention being maintained as smoothly as if there were no other focus. It involves skilled action requiring continued attention or skillful participation, not automatic action or pliantly being acted on (e.g., just holding or fiddling with an object in a nonchallenging way, such as absently flipping the jumping jack or submitting to having an arm moved).

Rogoff et al. (1993) provided an example of simultaneous attending by a San Pedro 20-month-old who repeatedly kept track of two or three competing events while engaging with a jar:

María watched her mother present the jar to explore while María simultaneously handed another toy over to her cousin; she monitored her mother demonstrating the jumping jack while she extracted the peewee doll from the jar; she noticed everything the interviewers did without breaking her activity with the jar; she monitored her cousin

subtly taking various objects while she admired the peewee doll and skillfully put it in the jar; and on and on. (pp. 50-51)

In some cases (among San Pedro caregivers only), simultaneous attention occurred in a smoothly extended ongoing fashion, such as when a caregiver continuously, in a rapid unbroken iterative sequence, monitored and responded to the toddler (who was trying to operate the pop-up puppet) while monitoring and engaging with an older sibling (who was whispering something to her) and replying to the interviewer's question. Such attention usually involved a gaze sequence that we liken to a hummingbird's flight pattern—not resting anywhere long but taking in the necessary information in several places. (Rogoff et al., 1993, referred to this as an "air traffic controller" attentional pattern.) In these cases, it is difficult to determine the number of episodes of competing events because of the smooth flow of attention among a series of simultaneous competing events. Therefore, we arbitrarily considered a string of such "hummingbird" attention to comprise two competing events, because it clearly involved more than one episode of competing events although segmentation into two or three episodes was not clear. If anything, this arbitrary decision for this special type of simultaneous attending underestimates the extent of simultaneous attending in the San Pedro sample.

Alternating time-sharing of attention involves attending to competing events, with one event at a time being the primary focus, while the other(s) is(are) placed temporarily on hold.² The person attends with a back-and-forth sequence between competing events, focusing on one while momentarily stopping progress in another. Although nothing demanding is occurring in a secondary activity while attention is directed toward the primary activity, both (all) foci are kept going, without either being abandoned. For example, a mother might stop midsentence in an adult conversation to answer a child's request and then return to the adult conversation. Or a toddler might briefly interrupt an interaction with the mother to attend to the sibling and immediately return to continue interacting with the mother, attending in a back-and-forth manner between the activities, with each momentarily interrupting the other.

Shift of attention involves a shift away from the original focus without returning to it, without an apparent effort to keep both events going (as there is with alternating as well as simultaneous attending). The person interrupts attention to one event to attend to another event or activity. For example, a toddler stops playing with the mother and turns to play with the older sibling for an extended stretch of interaction.

Unaware of competing events identifies an episode in which a person appears not to be aware of a competing event to which one would expect them to attend, instead staying focused on the original event. For example, a toddler continues playing with the mother and does not seem to attend to the older sibling's invitation, although he otherwise appears eager to play with the sibling. This was coded only if there was something attention-grabbing or unusual about the event to which a person would be expected to attend. The event was not coded if it was ambiguous, such as if the person could be trying not to pay attention to an event (e.g., suppressing attention to a sibling interruption) or was not giving evidence of attending to an ongoing, lengthy background activity.

Reliability

For each community, coding of the 16 families was conducted by an assistant who was a native of the community; both were unaware of the hypotheses of the study. Overlapping data of 8 families from each community (50% of the data) were coded by a third reliability coder (Pablo Chavajay, from San Pedro and residing in the United States). This procedure, similar to that used by Rogoff et al. (1993), was necessary because

² About 90% of the episodes in both communities involved only two co-occurring competing events; occurrence of episodes with three or four co-occurring competing events was rare.

coders needed to be fluent with the verbal and nonverbal communication and customs of the community they coded; there are few people fluent in Tz'utuhil, Spanish, and English who could serve as coders. Reliability was monitored and calculated between the reliability coder and each research assistant throughout the coding to ensure that both coders followed the same coding guidelines across communities.

Reliability coefficients were estimated using Pearson correlation coefficients, with 50% of the data coded by the reliability coder. The reliability of the identification of episodes involving competing events was .99. Reliability for simultaneous attention was .99, for alternating attention was .99, for shifting attention from one event to another was .99, and for being apparently unaware of a competing event was .90.³

Results

To control for variations across communities in frequency of competing event episodes (see Table 1), we carried out analyses on the proportion of total episodes that involved each type of attention management. (For the caregivers, there were a significantly greater number of competing event episodes in San Pedro than in Salt Lake; for toddlers, there were no significant community differences in the number of competing event episodes.^{4,5}) Analyses using raw frequencies yielded the same findings as those based on proportions. Figure 1 shows the raw frequencies on a case-by-case basis (combining child-focused and adult-focused segments) to help in the visualization of the pattern across communities and to present within-community variation graphically.⁶

Attention Management During Child-Focused and Adult-Focused Segments

This study examined whether the attentional pattern observed in child-focused events in the previous study by Rogoff et al. (1993) would also appear in adult-focused events, in which adults' primary focus was not on the toddlers but on interactions with other adults, although they might also engage with the toddlers in the background. Table 2 presents the *t* values and significance levels. To determine significance, we used the Dunn method of multiple comparisons with the Bonferroni inequality for determining the critical value of the *t* statistic for familywise error (Glass & Hopkins, 1984). Using the Bonferroni correction makes our analyses quite conservative, espe-

cially given the systematic nature of our predictions for each analysis. Several comparisons presented in Table 2 were only marginally significant once the Bonferroni correction was applied; however, they were also consistent with the overall pattern expected. The pattern was similar in the child-focused and adult-focused segments, for both caregivers and toddlers, and resembled the pattern reported by Rogoff et al.

Caregivers. In both the child-focused and adult-focused segments, San Pedro caregivers attended simultaneously to competing events in a higher proportion of episodes than did Salt Lake

³ The reliabilities within community (comparing the reliability of codings for the two communities separately) were also high, with one exception. The reliability figures for San Pedro and Salt Lake were .99 and .98, respectively, for identification of episodes involving competing events; .99 and .85 for simultaneous attention; .94 and .99 for alternating attention; 1.0 and .97 for shift of attention; and .60 and .95 for apparent unawareness of a competing event. The difference between the coders' means was significant for apparently being unaware of a competing event in San Pedro but for none of the other categories. We regard the low reliability of apparently being unaware of a competing event in San Pedro, like the other categories, as acceptable. The extent of this form of attention is, if anything, overestimated for the San Pedro sample, making our analyses conservative (because an overestimate goes against the direction of differences we predicted). The reliability coder judged that there were even fewer such episodes (25 out of the 835 episodes that this coder identified as involving competing events) than the coder whose judgments served as the data analyzed (38 out of this coder's 854 total episodes). The low reliability for this category may be due to the rarity of this attentional strategy in San Pedro.

⁴ The difference in the number of competing-events episodes for the caregivers became nonsignificant with a Bonferroni correction; however, a more conservative approach is *not* to use the Bonferroni correction. This is because the number of competing events is included simply as a control variable—we did not seek community differences in this variable, but if they occur we should take the differences into account in the other analyses. Hence, we conclude from the difference in competing events for the caregivers that it is more appropriate to analyze the proportion of competing events in which the different attentional strategies are used, rather than the raw frequencies of the attentional strategies.

⁵ As background information, we also examined whether the competing events involved attention to the partner (mother for the toddler and toddler for the mother), to other people (the 3–5-year-old sibling, other household members, or the interviewer or camera operator), to extraneous events occurring outside the group (e.g., the ringing of a phone), or to an object handled by oneself. Reliabilities were as follows: partner, $r = .95$; other people, $r = .96$; extraneous events (seldom occurred) $r = .78$; and object, $r = .99$. The similarities in frequency of competing events involving other people in the two communities suggest that differences in patterns of attention management would not derive from differing extents of social density of the competing events. All competing events for caregivers involved the toddlers, by definition; there was no significant difference between San Pedro and Salt Lake in the extent to which caregivers' competing events involved other people, $M = 82.0$ ($SD = 26.0$) and $M = 62.8$ ($SD = 24.2$), respectively, or an object, $M = 61.6$ ($SD = 14.1$) and $M = 45.9$ ($SD = 18.3$), respectively. There were also no significant differences in the types of events for the toddlers: events involving the caregiver, $M = 21.2$ ($SD = 15.2$) and $M = 21.0$ ($SD = 7.6$); events involving other people, $M = 59.1$ ($SD = 23.3$) and $M = 55.2$ ($SD = 24.9$); and events involving an object handled by the toddler, $M = 55.0$ ($SD = 20.5$) and $M = 47.2$ ($SD = 17.0$).

⁶ There were no significant gender differences in attentional patterns.

Table 1
Community Differences in Mean Number and Standard Deviations of Competing Event Episodes and Significance of Difference Across Communities

Sample	Child-focused segment		Adult-focused segment		Combined segments	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
San Pedro						
Caregivers	36.7	10.8	29.4	11.3	66.1	16.0
Toddlers	30.8	14.3	25.9	11.9	56.7	20.9
Salt Lake						
Caregivers	29.3	11.5	22.5	12.2	51.8	20.0
Toddlers	29.8	9.4	20.2	12.0	50.0	18.5

Note. For combined segments for caregivers, $t(30) = 2.23, p < .015$; for toddlers, $t(30) = 0.98, ns$.

Attentional Patterns

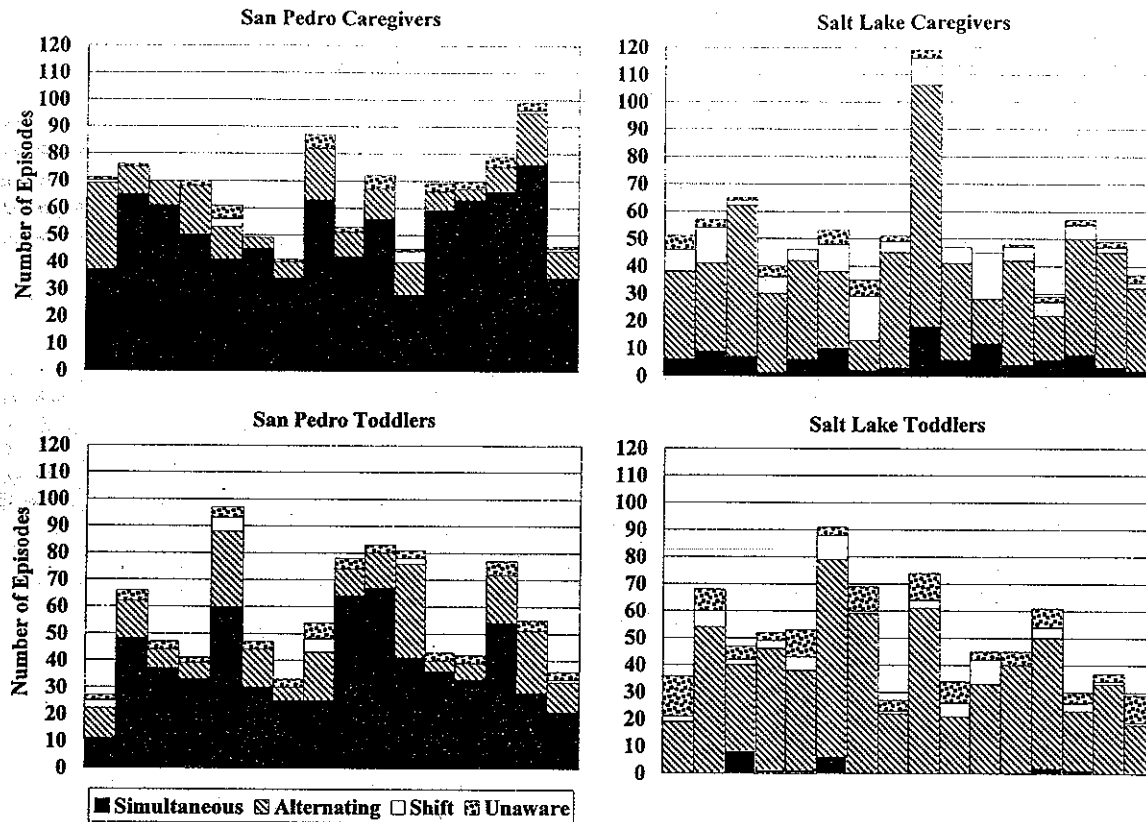


Figure 1. Case graph of frequencies of caregivers' and toddlers' attention management in San Pedro and Salt Lake (child-focused and adult-focused segments combined). Within communities, toddlers are arrayed from youngest to oldest girl, then youngest to oldest boy, with caregivers matched (as in Rogoff et al., 1993).

caregivers. In contrast, Salt Lake caregivers alternated their attention between competing events, and shifted their attention from one event to another without returning to the previous event, in a higher proportion of episodes (both child-focused and adult-

focused) than did San Pedro caregivers. The slightly higher proportion of episodes in which Salt Lake caregivers appeared unaware of competing events in the child-focused segment was not significantly different from the proportion for San Pedro caregiv-

Table 2
Mean Proportions and Standard Deviations of Episodes Involving the Different Types of Attention Management

Sample/Attention type	Child-focused segment					Adult-focused segment				
	San Pedro		Salt Lake		t(30)	San Pedro		Salt Lake		t(30)
	M	SD	M	SD		M	SD	M	SD	
Caregivers										
Simultaneous	.77	.10	.06	.05	24.90*	.78	.14	.20	.13	12.02*
Alternating	.20	.09	.69	.17	10.21*	.15	.12	.63	.21	7.82*
Shift	.01	.03	.19	.12	5.60*	.01	.02	.13	.15	3.13*
Unaware	.02	.02	.06	.07	2.15	.05	.05	.04	.06	0.75
Toddlers										
Simultaneous	.66	.16	.02	.06	14.71*	.67	.17	.01	.03	15.08*
Alternating	.26	.13	.75	.12	11.33*	.24	.16	.78	.14	10.01*
Shift	.02	.03	.06	.05	2.98	.02	.05	.09	.13	2.09
Unaware	.07	.04	.17	.12	3.31*	.06	.03	.11	.10	1.84

* $p < .05$, with Bonferroni correction.

ers, with the Bonferroni correction; there was no significant difference between communities in the extent to which caregivers appeared unaware of competing events in the adult-focused segment.⁷

Toddlers. Community variation in attention management by the toddlers showed patterns similar to those of the caregivers (see Figure 1 and Table 2). In both child-focused and adult-focused segments, San Pedro toddlers attended simultaneously to competing events in a higher proportion of episodes than did Salt Lake toddlers. In contrast, Salt Lake toddlers alternated their attention between competing events more than San Pedro toddlers did, in both child-focused and adult-focused segments. The slightly higher proportion of episodes in which Salt Lake toddlers shifted their attention from one event to another was not significantly different from the proportion for San Pedro toddlers, with the Bonferroni correction, for both child-focused and adult-focused segments. Salt Lake toddlers appeared unaware of competing events in a higher proportion of child-focused episodes than did San Pedro toddlers; in the adult-focused segment, with the Bonferroni correction, this was similar but not significant.

The patterns of attention for toddlers showed notable similarities with their own communities' patterns of attention management by caregivers (see Figure 1). In fact, the San Pedro *toddlers* were more likely to attend to competing events simultaneously than were the Salt Lake *caregivers* in both the child-focused and the adult-focused segments: $t(30) = 13.91, p < .05$ and $t(30) = 8.68, p < .05$, respectively. San Pedro toddlers' simultaneous attention correlated with their caregivers' simultaneous attention ($r = .7$), and their alternating attention also correlated ($r = .6$); there were no significant correlations between toddlers' and caregivers' attentional strategies in the Salt Lake sample.

Although toddlers' patterns of attentional management resembled their own communities' patterns of attentional management by caregivers, the toddlers were more likely to appear unaware and were somewhat less likely to attend simultaneously to competing events than were the caregivers of their community. With the adult-focused and the child-focused segments combined (because the patterns were similar in the two segments), the toddlers in both San Pedro and Salt Lake appeared unaware of competing events in a higher proportion of episodes than did the caregivers of their community: $t(30) = 4.14, p < .05$ and $t(30) = 3.49, p < .05$, respectively. Toddlers also were less likely than caregivers to attend simultaneously to competing events in Salt Lake, $t(30) = 5.10, p < .05$, but not significantly so in San Pedro, $t(30) = 2.31$. There were no other significant differences between the toddlers and the caregivers of their respective communities.

Do Schooled Mothers in San Pedro Manage Their Attention Like Mothers in Salt Lake?

To investigate whether extent of participation in the Western institution of schooling in San Pedro would be associated with an attentional pattern similar to that of the middle-class U.S. caregivers, we examined the correlation of San Pedro mothers' years of schooling (which ranged from 0 to 10 years) and their attentional management. As expected, there was no significant correlation between their amount of formal schooling and their type of attention management (attending simultaneously = .01, alternating = .17, shifting from one competing event to another = .00, and

appearing unaware of competing events = -.37, with child-focused and adult-focused segments combined; no significant correlations were found when child-focused and adult-focused segments were considered separately either).

Although the sample size is small, the findings replicate those of Rogoff et al. (1993), providing support for their idea that attentional patterns are resilient cultural practices that do not change with the extent of exposure to schooling represented in these two samples, unlike school-like discourse practices (amount of talk, explanations, language lessons, and treating children as conversational peers) that the small sample of more-schooled San Pedro caregivers used more frequently with their children.

Discussion

San Pedro caregivers and their toddlers were more likely to attend to competing events simultaneously than were Salt Lake caregivers and their toddlers, who were more likely to alternate their attention to one event at a time. The Salt Lake caregivers and toddlers also showed a pattern of being more likely to shift their attention or to appear unaware of competing events than the San Pedro caregivers and toddlers, although in some of these comparisons, differences became nonsignificant with Bonferroni correction.

San Pedro caregivers were usually in tune with the adult conversation, the toddlers' activities, and older children's activities as they simultaneously attended to these events. This keeping track of all events at once sometimes took the form of "hummingbird" attention (which Rogoff et al., 1993, referred to as "air traffic controller" attention), in which competing events are smoothly attended to without disrupting their flow. Hummingbird attention was only observed with San Pedro caregivers (and was seen in both child-focused and adult-focused segments).

San Pedro toddlers were also extremely likely to attend to events simultaneously. The fact that these young San Pedro children demonstrated greater simultaneous attention than did the adults in Salt Lake (in the present study, as in Rogoff et al., 1993) supports the idea that they are developing cultural patterns of attention management. Although the toddlers already followed the cultural pattern of the caregivers of their community, their attentional management may still be developing: In both communities, the toddlers appeared unaware of competing events more frequently than did the caregivers of their communities, and in Salt Lake City the toddlers less frequently attended simultaneously than did caregivers.

The present study extended the findings of Rogoff et al. (1993) by (a) demonstrating generality of community differences in attention management when the primary focus of the activity was either the toddler's activity or adult conversation, (b) examining and controlling for the prevalence of episodes involving competing events, (c) limiting the study to families in both communities who

⁷ The design of the study ensured that all of the families had at least the toddler and an older sibling. We also examined whether simultaneous attending in San Pedro related to caregivers having more practice attending to multiple children. There was no significant correlation between caregivers' simultaneous attention and number of siblings per family ($r = .15$); there was no significant correlation for Salt Lake caregivers either ($r = -.07$).

had a 3-5-year-old in addition to the toddler to rule out this simple explanation of the differences in attentional management, and (d) examining whether mothers with more schooling in San Pedro would attend in ways that resembled the Salt Lake mothers, who had a great deal of schooling. After discussing these extensions, we consider other possible contributors to the patterns that we found.

Generality Across Child- and Adult-Focused Activities

San Pedro caregivers and toddlers more frequently attended simultaneously than did their Salt Lake counterparts, whether the ongoing activity focused on the toddlers' exploration of novel objects or on casual conversation and interviewing among adults. The generality of the differences in attentional patterns across child-focused and adult-focused activities supports the idea that the attentional patterns are somewhat pervasive cultural practices rather than simply reactions to immediate circumstances (which, of course, would also play a role).

It is possible, however, that in circumstances outside of family interactions, community patterns of caregivers' and toddlers' attentional management may differ from those we observed. Different patterns may occur if the competing events are not in the context of a conversation but in other contexts, such as competitive sports that call for other communicative actions or technological situations in which competing events do not involve immediate human interaction.

Research on the use of attention in other communities is also needed in order to examine whether there are other types of attention management than those reported in the two communities investigated in this study. There are probably more than two patterns of management of attention to competing events. In Rogoff et al.'s (1993) study, people from a middle-class urban community in Turkey and a tribal community in India both showed some simultaneous attention (but less than in San Pedro), a great deal of alternating attention, and less likelihood of appearing unaware of competing events than in the Salt Lake community.

Prevalence of Competing Events

Although there were more episodes of competing events for San Pedro than Salt Lake caregivers, the community differences in attentional patterns occurred whether the number of competing events was taken into account (using the proportion of events in which each attentional strategy was used) or not. Thus, the community differences in attentional management cannot be accounted for in terms of the number of episodes involving competing events within our observational setup. However, the more frequent simultaneous attention observed in San Pedro may stem from a history of greater availability of competing events (because families tend to be larger and people tend to be in each other's presence to a greater extent), providing greater opportunities to practice attending simultaneously. This would not challenge the existence of differences in attentional management but could help account for them.

Presence of 3-5-Year-Old Siblings in Addition to the Toddlers

In the Rogoff et al. (1993) study, the Salt Lake sample included more single-child families and more firstborn children than did the

San Pedro sample, raising the possibility that the differences in attentional management resulted from the individual mothers' and toddlers' experience with managing their attention in the presence of older children. However, the present findings do not support this argument, because our study included families with toddlers with at least one 3-5-year-old sibling and found community patterns of attentional management similar to those in the Rogoff et al. study.

It may be that communitywide prevalence of large families rather than individual family differences in size contributes to the nature of cultural patterns of management of attention. If so, caregivers with only one child, in a community in which large families are usual, may exhibit the cultural pattern of attentional management that fits their community rather than displaying attentional patterns that might be simply a product of their own individual exposure to competing events in their particular family. Cultural practices develop around the expected everyday circumstances of families over historical time; they do not just appear with the circumstances of each family (LeVine, 1980). Thus, family size might relate to attentional practices on the basis of community experience rather than individual experience. Thus, we find it plausible for routine family size to contribute to cultural practices in the use of attention, even if the cultural attentional patterns do not seem to result from the presence of at least one older child in these families.

Community Change: Participation in Western Schooling

Cultural patterns of attending may be stable over generations, but they may also change as members of a community engage in institutions that derive from other communities, such as Western schooling. In San Pedro, schooling represents contact with an institution that is central to (and has roots in) middle-class European and U.S. cultural practices. In Rogoff et al.'s (1993) study, San Pedro mothers with sixth- to ninth-grade schooling (compared with those with none to third-grade schooling) more frequently used communication formats prevalent in school and common among Salt Lake City middle-class mothers, including more talk, explanation, language lessons, and treating toddlers as conversational peers. In the present study, the attentional pattern in San Pedro did not differ with the mothers' extent of formal schooling (from 0 to 10 years), suggesting that this extent of schooling may not have such an effect on attentional practices. These findings are tentative because of the small sample size, but they are consistent with the findings of Rogoff et al., who also used a small sample.

It may be that features of how people talk in school are easy to notice and learn and are adopted after a few years of schooling, whereas attentional patterns may be more resilient cultural practices that change only with generations of cultural contact and community changes. Consistent with this suggestion are observations in the Indian community in which Phillips (1983) observed that "nonverbal behavior also seems to be culturally conservative in nature, or generally less subject to cultural change than other domains of behavior" (p. 131).

Other Potential Sources of Community Differences

We would be surprised if a cultural practice such as attentional management results from a single cultural feature; we expect that the pattern may involve a constellation of related cultural practices.

Several related practices that may contribute to the observed patterns include cultural values for means of communication, emphasis on keen observation, and group versus dyadic prototypes for social interaction.

The cultural differences in attentional strategies may relate to prevalent means of communication. As Rogoff et al. (1993) suggested, caregivers attending to several competing events simultaneously may use verbal channels of communication in adult conversation (e.g., responding to the interviewer) and rely primarily on skilled and articulate nonverbal communication such as gestures, touch cues, and postural cues with the toddlers. This would fit with attentional literature suggesting that modality differences may facilitate attention to several events (Allport, Antonis, & Reynolds, 1972; Keele, Pokorny, Corcos, & Ivry, 1985; McLeod, 1977).

The use of simultaneous attention may also relate to differing emphasis on keen observation as a means of learning in the two communities. Very young San Pedro children are expected to be keen observers of the events taking place at home, at work, and within public life (Chavajay, 1993; Rogoff, 1981, 1990). Their opportunities to observe and participate in adult activities are greater than in several middle-class European American communities, consistent with observations in many other communities (Barnhardt, 1982; Fortes, 1970; Greenfield & Childs, 1977; Heath, 1989; Morelli et al., 1992; Philips, 1983; Ward, 1971; Watson-Gegeo & Gegeo, 1989; Williams, 1958). European American middle-class families' reliance on structuring children's learning by providing lessons out of the context of their practical use (Heath & Branscombe, 1986; Rogoff et al., 1993; Scribner & Cole, 1973) may require less keenness of attention to ongoing activities for learning.

Another cultural practice that may relate to simultaneous attention strategies is coordination with a group. Members of Mayan families often maintain proximity in a semicircle (Chavajay, 1993), with children as well as adults engaged in active observation and listening to ongoing conversation and events. Rogoff et al. (1993) observed that San Pedro toddlers and caregivers frequently coordinated their activities with other members of a group in multiway engagements rather than in a dyadic fashion, as Salt Lake toddlers and caregivers often did even when other people were involved in the same activity. It appears that the prototype of attending to others in Salt Lake is to engage with one person at a time, even when several potential partners are present, whereas in San Pedro, people engage with multiple people (or other activities) at once.

These observations resemble Bateson's (1994) comparison of dyadic "quality time" and multiple foci of attention:

In the course of a day's work, [a village woman in Iran] prepares food; she keeps track of the children and the old people, including looking after them if they are sick; and if she has an hour here or there she sits down at the carpet loom, which is right in the center of the household. She can be interrupted at any moment. . . . Women don't stop caring for children when they start cooking dinner. The current ideal of "quality time" for women who follow a schedule of work outside the home suggests that mixing tasks is inferior even within the home, yet doing a task like shelling peas or raking the lawn alongside a child often makes for a deeper companionship than stripping the moment down to a single focus on relationship. (pp. 107-108)

Capacities or Cultural Practices?

Although the community differences we observed in management of attention could be regarded as differences in skill in attending to several events simultaneously, we prefer an interpretation of cultural *preferences*. As Rogoff et al. (1993) pointed out, "It is not clear that the Salt Lake toddlers and caregivers were less able to attend simultaneously to several events. . . ; rather, the differences may reflect cultural preferences in the deployment of attention" (p. 88).

Whereas attending carefully to a range of events occurring at the same time may be desirable in San Pedro and some other communities, focusing attention on one event at a time may be desirable among middle-class families in some communities. Middle-class U.S. parents are often proud of their children for focusing their attention on one thing at a time (and may scold them for attending broadly: "Pay attention to what you're doing!"). Similarly, it is improper etiquette for middle-class Turkish mothers and children to interact with one another while mothers are talking to adults (Göncü, 1993). As Ruff and Rothbart (1996) stated, "We assumed that focused attention is a desirable state under many conditions and that many parents, at least in our culture, will promote it in their children when necessary" (p. 143).

The present research (along with Hirst et al., 1978; Neisser et al., 1981; Rogoff et al., 1993) indicates that attention can be focused in skilled ways on several activities at once, and this seems to vary in prevalence in different communities. Research indicating that U.S. middle-class children "understood" that attention could be focused on only one thing at a time (although younger children "showed little understanding," Flavell, Green, & Flavell, 1995, p. 710) may be evidence of these children's development of understanding of the attentional strategies of their cultural community—not development of understanding of attentional processes in general.

An important goal for future research is to examine constraints on simultaneous attending in communities where it is prevalent. Although San Pedro caregivers and children seemed not to interrupt one activity when attending to another, if they had been attending to just one of the events, they might have responded more quickly or skillfully than when they attended to several events at once. This would not discount the cultural differences in attentional management that we observed: San Pedro caregivers and children may attend primarily simultaneously, in an important contrast with the prevalent alternation of attention observed in Salt Lake caregivers and children, and still require more effort or greater time to do so than if events are not competing.

Another possibility is that very close microanalysis (resembling the work of Wright, 1994; Pylyshyn, 1996) might detect that even the San Pedro sample's simultaneous attention to competing events may have involved extremely rapid alternation of attention, although much more rapid than the clear alternation observed in the Salt Lake sample. These are possibilities that would help us to further understand how some people manage to attend simultaneously to complex events with nonautomatic skill.

Different ways of managing attention may be useful under differing circumstances. For example, managing attention to competing events may be advantageous for teachers monitoring and supporting classes working in multiple small groups, for mothers

of twins, and for athletes in team sports such as basketball and soccer:

A soccer goalie must be aware of the play developing against him and of where all the players are at any given moment, but he must also pay specific attention to the ball as it is shot at him. A good soccer player must have good peripheral vision (awareness). (Papanikolaou, 1992, p. 19)

As Bateson (1994) suggested, "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).

In conclusion, the findings of the present research provide insight into processes of human attention across communities. Our research suggests that simultaneous attention may be practiced in some cultural groups much more commonly than in others. This may relate to cultural expectations regarding what are considered appropriate and desirable ways to attend to others in social interactions rather than to variation in skill. Examining the process of attention management in other cultural communities provides a more comprehensive understanding of the nature and development of human attention.

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Received July 25, 1997

Revision received December 29, 1998

Accepted December 29, 1998 ■