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RESEARCH ARTICLE

How pervasive is joint attention? Mother-child dyads from a Wichi community reveal a different form of "togetherness"

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Abstract

Theories of early development have emphasized the power of caregivers as active agents in infant socialization and learning. However, there is variability, across communities, in the tendency of caregivers to engage with their infants directly. This raises the possibility that infants and children in some communities spend more time engaged in solitary activities than in dyadic or triadic interactions. Here, we focus on one such community (indigenous Wichi living in Argentina's Chaco Forest) to test this possibility. We examine naturally occurring attentional activity involving the mother and child among the Wichi and among Eurodescendant Spanish-speaking families living in Argentina. We engaged 16 families—8 Wichi and 8 Eurodescendant—in an observational study of interactions between caregivers and their 1- to 2-year-olds. A mixed-analytic approach revealed no differences between communities in the proportion of time infants spent alone, or in mother-child interaction. What does differ, however, is how mothers engage in these interactions: Wichi mothers spend a greater proportion of their time observing their infants than do Eurodescendant mothers. Moreover, when infants in both groups are alone, they focus their 'solitary' activities differently: Wichi infants engaged primarily in observation alone, whereas Eurodescendant infants were more focused on the object. Finally, all mother-child pairs engaged in dyadic and triadic (object-infant-caregiver) patterns of attention, but the triadic patterns differed considerably between cultures: Among Wichi, mothers actively "watched" infants as they engaged with objects, whereas Eurodescendant mothers actively engaged with their infants in joint attentional episodes. This work illustrates how attention and socialization, key mechanisms of early development, are culturally organized.

KEYWORDS
cultural variation, early socialization, joint attention, Wichi

Research Highlights

- Longitudinal, observational investigation of mother-infant interaction in two distinct Argentine cultural groups (Wichi and Eurodescendants) reveals both commonalities and clear community-based differences in interactions between mothers and their 1- to 2-year-olds.

- Wichi mother-infant dyads engaged primarily in visual observation of one another, but their Eurodescendant counterparts tended to engage in more verbal or physical interaction.
- We identify a new form of triadic interaction—lateral joint attention—among the Wichi dyads.
- This work underscores that attention and socialization, key mechanisms of early development, are culturally organized.

1 | INTRODUCTION

Developmental science has provided considerable insight into the power of parent-infant joint attention as a platform for learning (Bruner, 1975; Carpenter, et al, 1998; Tomasello, 1999; 2008). The evidence reveals how this form of triadic connectedness, with parent and infant focusing together on objects or events in their immediate environment, supports infant language, cognitive and social-emotional development (e.g., Bruner, 1975; Byers-Heinlein, et al., 2021; Carpenter, et al, 1998; Forgács, et.al, 2022; Parise & Csibra, 2012; Perszyk, & Waxman, 2018; Stern, 1995; Tomasello, 1999; 2008; Trevarthen, 1998; Waxman & Markow, 1995). Although the evidence is compelling, it is drawn from a narrow empirical base, including primarily parent-infant dyads from Western-educated communities (Bakeman & Adamson, 1984; Bard et al., 2022; Carpenter, et al., 1998; Fogel, 2011; Gaffan, et al., 2010; Keller, 2007; Snow, 1977; Tomasello, 1999).

However, when we step outside of this particular cultural context, it becomes clear that the form of these interactions is far from the norm. In many cultural groups, mothers engage in relatively little direct interaction with their infants (Heath, 1983; Gaskins, 1999; Pye, 1986; Schieffelin & Ochs, 1986; Shneidman & Goldin-Meadow, 2012; Shneidman, et al., 2013), and may even refrain from talking directly to their infants before they themselves begin to talk (Brazelton, 1977, Schieffelin & Ochs, 1986). Most accounts of parent-infant engagement in such communities come from ethnographic descriptions (e.g., Brown, 2011; Schieffelin & Ochs, 1986, De León, 2011; Paradise, 1994). These tend to focus on how adults' beliefs about childhood and childrearing practices (e.g., child-centered vs. situation-centered societies shape their patterns of early interaction, socialization and learning (c.f., Ochs & Schieffelin, 1984). For example, in several distinct communities including the Maya (Brown, 2011; De León, 2011; Gaskins, 1999; Pye, 1986) and related groups (the Gusi (LeVine et al., 1996), Kaluli (Schieffelin, 1990), and rural Samoans (Ochs, 1982, 1988)), parents do not engage directly with their infants in proto-conversations or other dyadic interactions. Instead, infants in these cultural communities appear to be socialized as observers, more than active participants. This observation has led many to conclude that interactive episodes of joint attention are not prevalent in all communities (see De León, 2023 for a review).

In addition to the ethnographic work, there is also psychological evidence documenting the amount of time infants across different cultures engage with others (Childers, et al., 2007; Hernik & Broesch, 2018; Mastin & Vogt, 2016; Shneidman & Goldin-Meadow, 2012; Shneidman, et al., 2013). For example, infants in rural Mozambique are reported to spend more time alone, in solitary engagement (e.g., playing with objects) than their urban peers, who spend more time engaged in triadic joint interactions (e.g., playing with objects and an adult; Mastin & Vogt, 2016).

Unfortunately, however, many investigations in non-Western cultural settings, perhaps unwittingly, bring with them measurement bias because they rely on methods tailor-made for one cultural context (primarily Western communities) to make inferences about another (Bakeman & Adamson, 1984; Hernik & Broesch, 2018; Washinawatok, et. al, 2017). In an effort to minimize this bias, other researchers have advocated for shifting the focus on distinct components of engagement (Mastin, 2013). Still, on the basis of current comparative methods, it remains difficult to discern whether and how caregiver-infant interactions differ across the globe. Put differently, the concern is whether analyses based on Western designs and coding systems, however detailed and decolonized, successfully detect alternative kinds of social engagement in non-Western dyads.

Rogoff and colleagues' (Chavajay & Rogoff, 1999; Paradise & Rogoff, 2009; Rogoff et al., 2003; Rogoff, 2014) comparative analyses of parent-child attention management in indigenous Mayan and Western-educated U.S. populations suggest that with sufficiently sensitive methods, such differences can be detected. They report that Mayan families simultaneously track several different events involving several different individuals and goals, but that Eurodescendant families tended to focus specifically on one individual at a time (Chavajay & Rogoff, 1999). Also compelling is the evidence that young Maya children learn via attentive observation of the coordinated actions of others (e.g., Correa-Chávez & Rogoff, 2009; Gaskins, 1996, 2000; Greenfield, 1984, 2004; Rogoff et al., 2003; also see Lancy, 2010 and Paradise & Rogoff, 2009).

Bard and colleagues (Bard et al., 2022) recently offered an even more comprehensive approach. Focusing specifically on joint engagement (JE), they provided evidence from a range of communities, across different cultures and even different species, that bear on principles of interactive attention and engagement with a broad range of social partners (e.g., peers, older siblings, mothers). Their new work, together with evidence from others, offers a clear proposal: that despite differences

in the way that joint attention is expressed in different cultural communities, adults in all communities nevertheless engage young children in interactions that promote engagement and learning (Bard et al., 2022; De León, 2023).

However, because cross-cultural evidence of interactions with infants remains sparse, several questions remain unanswered. Here, to begin to fill this gap, we ask how infant attention and socialization, key mechanisms of early development, are inflected and shaped by culture. Our investigation is comparative, including two distinct communities in Argentina. We focus on the indigenous Wichi living in a relatively unexplored village, who speak their native language (the *Wichi lhomtes*) exclusively at home, and whose ontologies about their environment differ markedly from many communities studied empirically to date (Taverna, et al., 2012; Taverna & Waxman, 2020). In the current investigation, our goal was to identify the early social, interactive scaffolding in which Wichi infants are being raised and to compare this to the interactions among Eurodescendants. Certainly, the Wichi and Eurodescendant populations differ along several dimensions, including their native language, adults' level of Western educational attainment, epistemological orientations, contextual and sociodemographic factors, among others. In our view, one in which culture is not a single "independent" factor, we interpret these dimensions as interdependent (Medin et al., 2013).

The study was observational: building upon longstanding relationships within each community, we were granted permission to videotape infants, in their natural surroundings, and to use these to identify patterns of early engagement, attention and interaction. Rather than adopting a coding system based on work in Western communities, we instead developed an observational coding system that emerged from the behaviors we observed in each community in their own physical and ecological setting. In this way, our intention was to capture patterns of joint attention that may otherwise have remained hidden.

Based on prior evidence from communities in which caregivers are less likely than Westerners to engage their children directly (Heath, 1983; Gaskins, 1999; Pye, 1986; Schieffelin & Ochs, 1986; Shneidman & Goldin-Meadow, 2012; Shneidman, et al., 2013), we expected that in comparison to their Eurodescendant counterparts, Wichi children would spend more time engaged actively in solitary activities (e.g., observing others' interactions; manipulating objects on their own) and less time interacting directly with others. More provocatively, perhaps, we suspected that this careful observational study might permit us to uncover alternative forms of "togetherness" in Wichi engagement and socialization.

1.1 | The communities

1.1.1 | The Wichi

The Wichi are an indigenous population from the Chaco Forest in the South American lowlands of Argentina. We have been working in the Wichi Lawet (Laguna Yema, Formosa) for more than a decade (Baiocchi, et al., 2019; Taverna, et al., 2012, 2014, 2016, 2020, 2021). In this community, the Wichi depend economically on traditional activities. Men are responsible for hunting, fishing, and manufacturing wooden tools, furniture, and handicrafts. Women are responsible for meal preparation, gathering fruits, wood, and other plants, a task that usually requires all-day expeditions deep into the Chaco Forest. Infants and children, who typically accompany their mothers on these expeditions, are also engaged in other daily activities in the natural environment, including catching lizards, collecting wood, picking fruits, walking in the forest, and swimming in the lagoon (Taverna et al., 2014). It is important that children as young as 4-year-olds learn which plants and animals of the forest are dangerous and which are healing (Padilla & Taverna, in preparation).

The Wichi in this community live in a group of small houses, constructed with local materials (e.g., adobe, *aibe* and wood) and surrounded by the *monte*[1]. Their family units are large, typically including eight or ten people who live together. The Wichi spend most of their time outside, where they drink *mate*, a traditional South American caffeine-rich infused herbal drink, and engage in conversations (Escuela N° 421 Wichí Lako, Provincia de Formosa, Ministerio de Cultura y, Educación).

The Wichi language is the primary language within families and in community life (Taverna & Waxman, 2020; Taverna, 2021). Children are not introduced to Spanish, the national language of Argentina, until they enter public school at around age five or six. Infants' primary interlocutors in the first year are the family; especially the mother or other related women. Infants are carried in their arms and rarely put down in their first year. Older children play with infants and participate in their care. Infants and children often play together without noticeable adult supervision, but with an adult within view and/or hearing distance. Western-style toys are almost inexistent; typical Wichi toys include trucks made from wood (cardon: *Stetsonia coryne*), slingshots, marbles and rag dolls (Suarez & Montani, 2016). In addition, Wichi children from our corpus play with all sorts of objects available in their environment (sticks, stones, and other artifacts they encounter) (Padilla & Taverna, in preparation). Like adults, children spend most of the day outside, either in an area in front of their house (or that of other kin) or in the fields that adjoin the houses.

Once infants begin to speak, Wichi mothers and other kinship caregivers modify their language register when addressing them (e.g., infant-directed speech, pragmatic-discursive modifications), using a language register distinct from that used in Wichi adult interactions (Taverna, 2021). This Wichi "motherese" is characterized by a constellation of prosodic, lexical, and pragmatic-discursive features. First, in contrast to "motherese" in Western linguistic populations, the prosody of Wichi "motherese" does not differ considerably from adult–directed speech (e.g., neutral tone, lack of exaggerated contours). Second, a set Wichi baby talk lexical items ('*mimi*' [water]; '*chuku*' [doggie]) were discovered that thus far had not been captured in the literature on this language. In addition, at a discursive-pragmatic level, Wichi "motherese" at infants' pre-grammatical stage focused on discursive strategies with directive functions (prescriptions and/or denotations). For example, a group of prescriptive strategies in the here and now are characterized by orders referring to concrete actions (*yajnencho* [don't

come down]), prescriptions in the near future in the form of warnings (*che suwele hin'am* [the non-Wichi person is watching you]), and denotations that label objects or events in the child's surrounding world. This "labeling" function ranges from names of objects of interest to the child (*tititi* [little car]) through the use of Spanish loans (*jutu* [foto—photo]) to names that denote people (*siwele* [non-Wichi person]) and animals (*cheche* [parrot]//*neche* [seriema].

For Wichi mothers and other caregivers (including older children), a primary goal is to teach infants the Wichi language and the Wichi way of life, which emphasizes hospitality, solidarity, and a sense of community (Padilla & Taverna, in preparation).

1.2 | Eurodescendant Spanish speaking community

Spanish-speaking children are from Rosario, the third largest city in Argentina and an epicenter of international commercial interchange. Young infants in this community tend to spend time with their caregivers in the home and in large public areas including parks and community centers. As such, infants have many conversational partners, including passersby, who greet them and tend to respond to infants' utterances. By the time they enter school, children participate in local associations and clubs where they learn football, swimming and other sports.

2 | METHOD

2.1 | Participants

Eight Wichi dyads from Laguna Yema in Formosa province Argentina (with a population of about 1200) and eight Spanish-speaking Eurodescendant dyads from Rosario (with a population over one million) participated in a longitudinal design, beginning when the infants were roughly 12 months and continuing until they were 30 months. This corpus is part of a larger ongoing longitudinal naturalistic study involving monthly videotaped recording of 9 Wichi children (Taverna, 2023). (See Table 1 for detailed data collection and Table 2 for sociodemographic data). First, Aurelia Pérez and Elida Pérez, both native Wichi speakers who have participated in, and served as co-authors, in several of our projects (see, e.g., Baiocchi, et al., 2019), recruited Wichi families. Our team's success recruiting families is noteworthy, especially in this very small community where research is extremely rare and where factors including migration make recruitment difficult. Second, we recruited Eurodescendant families, aiming to match infants by age and sex across the two communities.

2.2 | Procedure

To capture a representative sample of daily interactions, the first author (A.T.) recorded mother-infant dyads once in the morning and once in the afternoon, yielding an average of 50-min of recording at each age. We used a video camera, equipped with a tripod and an external microphone placed near the child, to record a wide field of view free play, meals or snacks, roaming, and all individuals present throughout. Wichi families mostly chose a location outside their homes or in nearby gardens or fields (only 0.13% of the total time recorded were outside); Eurodescendant families mostly chose to videotape inside their homes, most of them living in flats without yards or gardens (only 0.17% of the total time recorded were outside). In both communities, when adults and children other than the mother-infant dyad were present during video recording sessions, all were instructed to ignore the camera and behave as they would it if it were not present.

2.3 | Coding

Video recordings were first transcribed using Elan (4.7.3). All Wichi transcriptions were then translated into Spanish by two trained bilingual speakers of Wichi (native language) and Spanish: Margarita Pérez and Aurelia Pérez (see Taverna and Padilla, 2020 for a detailed description of the methodological process used in our collaborative research). These translations were examined by Javier Carol, a linguist who is an expert on languages from Chaco region. We compared the amount of time each adult spent with the infant; the mother was the primary caregiver for all infants. The presence of other people was more pronounced among the Wichi, with an average of 2.8 adults and 1.7 children per observational time point, than for Eurodescendants (1.3 adults and 0.4 children per time point). Periods in which there was an inadequate view of the infant and others interacting with them were coded as *off-camera;* these were excluded from subsequent analysis. Interactions lasting less than 2 s were also excluded from subsequent analysis.

2.4 | Observational coding system for *infant-mother engagement*

Next, we adapted Strauss and Corbin's (1990) comparative method to identify a repertoire of observed caregiver-infant engagement in each community. To insure that we did not impose a Western-centric coding system or limit our focus to those particular forms of engagement reported in previously-studied populations, we focused on caregiver-infant engagement broadly, combining a bottom-up assessment of infant and caregiver behaviors in each community with a top-down conceptualization of engagement as behaviors in which individuals interact themselves, other individuals, objects and events (see Bakeman & Adamson, 1984; Carpenter et al., 1998; Mastin, 2013; among others). This resulted in an observational coding scheme that encompasses a wide range of behaviors that constitute coordinated of attention in caregiver-infant interactions.

2.4.1 | Caregiver behavior

We first divided principal caregivers' behavior into distinct, mutually exclusive periods based on their engagement with the infant. In doing

TABLE 1 Data collection.

Cultural group	Child	Mean age (months)				Total (h:min)
Wichi		12	18	24	30	
	CH1	x	x	x	x	03:53
	CH2	x	x	x	x	02:34
	CH3	x	x	x	x	02:40
	CH4	x	x			02:00
	CH5		x	x		02:00
	CH6			x	x	02:00
	CH7			x	x	01:40
	CH8			x	x	01:54
Total time (h:min)		03:21	04:04	06:33	04:43	18:41
Eurodescendant	CH9	x	x	x	x	03:28
	CH10	x	x	x	x	04:00
	CH11	x	x	x	x	03:07
	CH12	x	x			02:26
	CH13		x	x		01:49
	CH14			x	x	01:29
	CH15			x	x	01:47
	CH16			x	x	02:23
Total time (h:min)		04:24	04:25	06:57	04:48	20:29

TABLE 2 Sociodemographic data about infants and their families.

	Gender				Mother educational level				
	F	M	Average siblings	Average family members	Primary incomplete	Primary complete	Secondary incomplete	Secondary complete	Higher education
Wichi	5	3	1.5	5.25	1	4	2	1	0
Eurodescendant	6	2	1	3.75	0	0	0	0	8

that, we first asked: "Is the principal caregiver engaged with the infant"? There were three mutually exclusive and exhaustive answers to this question: No (a) Unengaged: the principal caregiver appears to be uninvolved with the child (e.g., she/he tidies the room while infant plays alone), Yes (Engaged) and Not Visible (Off-camera). If the answer was yes, then we coded two broad dimensions of caregivers' engagement: (b) Visual engaged: The caregiver observes the infant's activity, often with great attention, but does not participate actively (verbal nor behaviorally); (c) Relational engaged: The caregiver actively interacts with the child, either verbally or physically, coordinating her attention to the infant and available objects.

2.4.2 | Infant behavior

We divided the infants' activity in mutually exclusive dimensions. To do that, we asked: "Is the infant engaged with any aspect (him/herself, with something or someone) from the environment? There were three mutually exclusive and exhaustive answers to this question: No (Unengaged); Yes (Engaged) and Not Visible (Off-camera). If the answer was yes, then we coded broad dimensions of infant' engagement accordingly: Self-engaged: the infant appears to be engaged by himself or herself (observing a person, object or an event, playing with objects, etc.); Infant-person: the infant is engaged with a social partner (or with multiple partners); Infant-person-object: the infant is engaged in a three-way interaction with an object (or objects) and a social partner who is either actively involved or simply watching the infant interact with objects".

2.4.3 | Interaction between infant and caregiver

Caregiver and infant behaviors separately provide the foundation for identifying mutually exclusive and exhaustive categories of forms of

FIGURE 1 Frame sequence of triadic connectedness (Joint lateral attention and Joint attention) in Wichi mother-infant engagement. Joint lateral attention: The mother is sitting on a chair observing with pervasive attention his little son, who is sitting on the ground trying to reach a little ball (Figure 1.1–1.5). The baby makes great effort to pursue his aim showing several attempts to accomplish this (Figure 1.1–1.4). As a lateral participant, the mother uses different nonverbal channels, such gaze, posture, and even gesture: she raises her left asking for the other woman to help the baby reach the ball (1.2). During the entire process, the mother engages her baby through permeative attention until the baby finally accomplishes his aim, taking part in the interaction without explicitly intervention and in a more distanced interactional practice. Joint attention. Immediately after the baby caught the ball, it fells down near mother's lap (Figure 1.5). She takes the ball and gives it to the baby, initiating a joint attention episode.

infant-caregiver engagement (arriving at the coding scheme outlined below).

1. Solitary
   a. Solitary-unengaged: The infant is awake, but appears not to be engaged with or attending to any person, object or event.
   b. Solitary-spectator: The infant observes a person, object or an event, often with great attention, but does not actively participate.
2. Dyadic
   c. Dyadic: Object-engaged: The infant interacts with an object, with no participation of another person.
   d. Dyadic: social-engaged: The infant interacts with another social partner (or multiple social partners), including face-to-face interactions, verbal interaction, etc.
3. Triadic connectedness (see Figure 1 for a visual example of triadic connectedness).
   e. Joint attention: The infant is engaged with one (or more) social partner(s) while engaged in a shared topic (object, food, event, etc.). As in Bard et al.'s (2022) decolonized notion of Joint Attention, we consider episodes of Joint Attention that are expressed in one or more modalities (e.g., vision, touching) (see Figure 1.5–1.8 and 2.1–2.2).
   f. Lateral joint attention: the infant is engaged with an object or event while one (or more) social partner(s) watches attentively, but without active or overt intervention of any kind (verbal or behavioral). Following Clark's model of participatory communication (1996; Goffman, 1981), in parallel joint attention the caregiver is part of the interaction, engaged as onlooker from a position with reference to a central point (the child-object). However, unlike the traditional notion of joint attention, the caregiver and child do not engage directly. (See Figure 1.1–1.4).
   g. Off-camera: Periods in which there was an inadequate view of the infant and others interacting with them.

For all forms of engagements, a second independent coder re-coded a randomly selected section (10%) of each video. Agreement between coders ranged from moderate to nearly perfect. Caregiver engagement: $N_{episodes}$ = 147, a mean Cohen's k of 0.54 (0.66% agreement); Infant engagement: $N_{episodes}$ = 400 a mean Cohen's k of 0.82, (86% agreement); Infant-caregiver engagement: $N_{episodes}$ = 430 a mean Cohen's k of 0.74 (79% agreement,). For triadic connectedness, agreement was considerable: Joint attention $N_{episodes}$ = 430 a mean Cohen's k of 0.71, (89% agreement); Lateral joint attention $N_{episodes}$ = 430 a mean Cohen's k of 0.74, (94% agreement).

2.5 | Analyses

We pursued two interrelated analyses. First, we considered the total amount of time caregivers engaged with their infants, either engaged with the infant or observing the infant actively (Wichi: 16:20 h out of 18:41 h recorded/Eurodescendant 18:15 h out of 20:29 h). Second, we

Figure 1.5

Figure 1.6

Figure 1.7

Figure 1.8

FIGURE 1 Continued

Figure 2.1

Figure 2.2

FIGURE 2 Frame sequence of triadic connectedness (Joint attention) in Eurodescendant mother-infant engagement (Figure 2.1). The mother and her baby, sitting on the ground face-to face, throw a plane toy one and again (Figure 2.2).

focused more specifically on identifying the time infants spent in each of the different infant-caregiver engagement states. Our goal was to identify the types of interactions that scaffold infant attention across development and cultural groups.

3 | RESULTS

In both cultural groups, parents agreed to be videotaped and engaged freely in the videotaped sessions. Our observations of caregiver-infant interactions converge well with prior findings (e.g., Chavajay & Rogoff, 1999; Mastin & Vogt, 2016), but also advance these findings by identifying, for the first time, a distinct pattern of infant-caregiver social interaction in the Wichi community.

3.1 | Mothers' engagement states

Table 3 displays the means and standard deviations for Wichi and Eurodescendant mothers' engagement states across development.

TABLE 3 Mean (SD) proportion of time of engagement states spent by Wichi and Eurodescendant mothers at each age.

	Wichi		Eurodescendant	
Engagement state	**1-year-olds**	**2-year-olds**	**1-year-olds**	**2-year-olds**
Unengaged	0.29 (0.20)	0.44 (0.20)	0.43 (0.28)	0.46 (0.23)
Visual engaged	0.46 (0.21)	0.33 (0.18)	0.32 (0.19)	0.24 (0.13)
Relational engagement	0.25 (0.08)	0.23 (0.16)	0.25 (0.14)	0.30 (0.14)

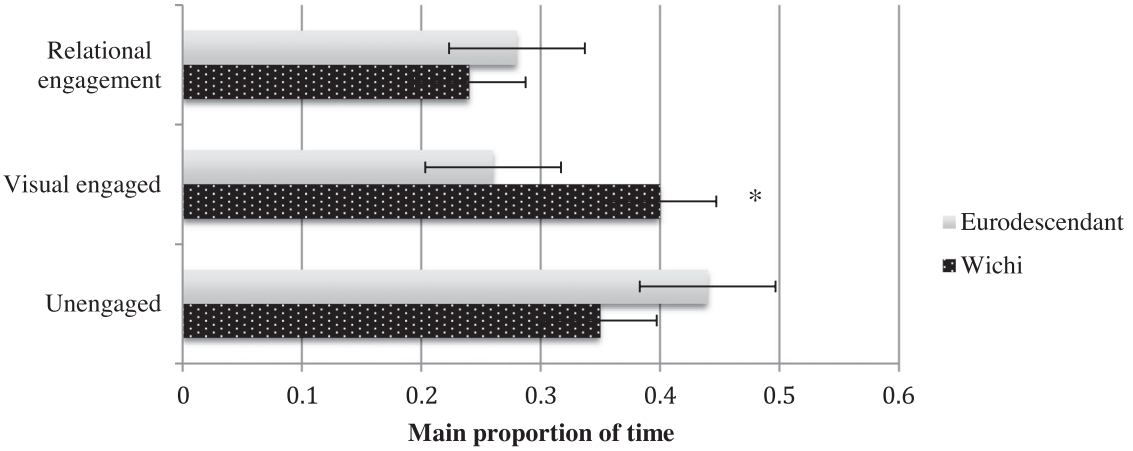

FIGURE 3 Mothers' engagement states in each cultural group.

We submitted the proportion of visible time each mother spent in each engagement state to repeated-measures analyses of variance with maternal engagement state (unengaged, visual engaged and relational engaged) as a within participant factor and culture (Wichi/Eurodescendant) and age (1-year-olds/2-year-olds)[2] as between-subjects factors. This analysis revealed a main effect of maternal engagement state (F (2,80) = 4.19, $p < 0.05$): both Wichi and Eurodescendant mothers tended to spend most of their time unengaged ($M_{Unengaged} = 0.39$, $SD_{Unengaged} = 0.23$) or visual engaged ($M_{Visual\ engaged} = 0.32$, $SD_{Visual\ engaged} = 0.19$) than in relational engagement ($M_{Relational\ engagement} = 0.26$, $SD_{Relational\ engagement} = 0.14$, both $p < 0.05$), both mean differences yielded strong effect size ($\eta^2 = 0.096$). This main effect was qualified by an interaction with culture (F (2,80) = 3, $p < 0.05$) with a medium effect ($\eta^2 = 0.079$): There was no difference in the amount of time mothers spent in relational engagement (Wichi $M_{Relational\ engagement} = 0.24$; SD = 0.14; Eurodescendant $M_{Relational\ Engagement} = 0.28$; SD = 0.15) or unengaged (Wichi $M_{Unengaged} = 0.35$; SD = 0.21; Eurodescendant $M_{Unengaged} = 0.43$; SD = 0.24, $t(42) = 1$, $p = 0.2$) . However, as Figure 3 shows, Wichi mothers spent a greater proportion of time in visual engagement (M = 0.40, SD = 0.19) than their counterparts (M = 0.26, SD = 0.16, $t(42) = 2.6$, $p < 0.05$). Mothers' engagement showed no reliable age effect, F (1,40) = 0.75, $p = 0.38$.

We next conducted a repeated measure ANOVA on engagement, with infant-mother engagement states (unengaged, spectator, dyadic object, person, joint attention and lateral joint attention) as a within-subjects variable, and with cultural group (Wichi/Eurodescendant) and age (1-year-olds/2-year-olds) as between-subjects factors. We found a main effect of infant-mother engagement state (F (5,20) = 19.2, $p < 0.001$), with a large effect ($\eta^2 = 0.32$): all infants spent more time engaged in at least one of the states ($M_{spectator} = 0.15$, SD = 0.016; $M_{Dyadic\ Object} = 0.25$, SD = 0.019; $M_{Person} = 0.16$, SD = 0.013; $M_{Joint\ Attention} = 0.23$, SD = 0.017; $M_{Lateral\ Joint\ Attention} = 0.12$, SD = 0.01) than unengaged ($M_{Unengaged} = 0.05$, SD = 0.008) (all $p < 0.001$). Moreover, this factor was qualified by an interaction with cultural group engagement state, (F (5,20) = 12.5 $p < 0.001$), with a large effect as well ($\eta^2 = 0.24$): Wichi infants spent more time unengaged (M = 0.08, SD = 0.06), as spectators (M = 0.22, SD = 0.14) and engaged in lateral joint attention (M = 0.15, SD = 0.07) than their Eurodescendant counterparts ($M_{Unengaged} = 0.03$, SD = 0.04; $M_{spectator} = 0.11$, SD = 0.04; $M_{Lateral\ Joint\ Attention} = 0.09$, SD = 0.03) (Unengaged: $t(42) = 3.3$, $p < 0.05$; Spectator: $t(42) = 3.4$, $p < 0.05$ Lateral joint attention: $t(42) = 3$, $p < 0.05$). Further, Wichi infants spent less time in dyadic object engagement or in joint attention episodes ($M_{Dyadic\ Object} = 0.16$, SD = 0.08; $M_{Joint\ Attention} = 0.17$, SD = 0.09) than their Eurodescendant counterparts ($M_{Dyadic\ Object} = 0.33$, SD = 0.13; $M_{Joint\ Attention} = 0.29$, SD = 0.12) (Dyadic Object: t (42) = 3.7, $p < 0.05$; Joint attention: $t(42) = 3.8$, $p < 0.001$) (Figure 4).

We also calculated the proportion of time that children in each community spent focusing on objects, either in dyadic interaction (interacting with an object, with no participation of another person) or triadic interaction (interacting with an object while one (or more) social partner(s) watched attentively with no overt intervention in

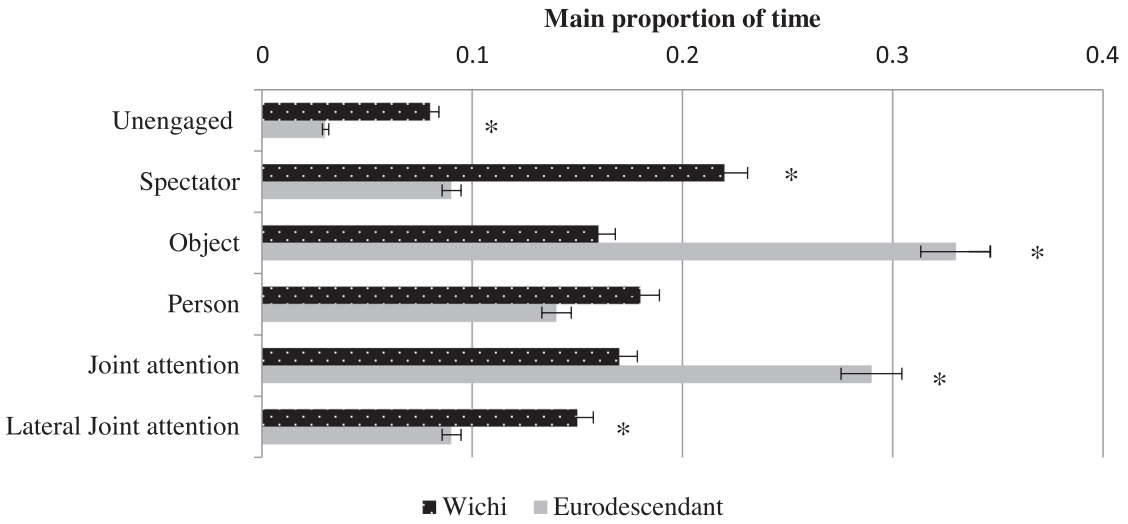

FIGURE 4 Main proportion of time in mother-infant engagement states across culture.

TABLE 4 Mean (SD) proportion of time infant-mother dyads spent in each engagement state at each age and in each cultural group (Wichi, Eurodescendant).

	Wichi		Eurodescendant	
Engagement state	**1-year-olds**	**2-year-olds**	**1-year-olds**	**2-year-olds**
Infants's solitary				
Unengaged	0.07 (0.04)	0.10 (0.08)	0.03 (0.32)	0.03 (0.031)
Spectator	0.20 (0.08)	0.25 (0.13)	0.16 (0.14)	0.06 (0.04)
Dyadic engagement				
Object	0.10 (0.05)	0.21 (0.20)	0.28 (0.12)	0.37 (0.14)
Person	0.26 (0.13)	0.13 (0.13)	0.17	0.12 (0.07)
Triadic engagement				
Joint attention	0.17 (0.05)	0.18 (0.09)	0.27	0.32 (0.13)
Lateral joint attention	0.18 (0.08)	0.12 (0.06)	0.08	0.09 (0.04)

lateral joint attention episodes). There were no significant differences between the cultural groups (Wichi $_{\text{dyadic object \& lateral joint engagement:}}$ = 0.33, Eurodescendant $_{\text{dyadic \& lateral joint -engagement}}$ = 0.41, $T(42) = 1.8$ *n.s.*). Thus, despite differences in the number and type of objects available to the infants and differences in where their interactions occurred (inside their homes vs. outside their homes, etc.), children from both communities spent comparable amount of time interacting with objects.

Although there was no main effect of age (F (1,40) = 0.9, $p = 0.3$), there was an age by engagement state interaction (F (5,40) = 4.1, $p < 0.05$) (Table 4). With increasing age, infants in both communities spend more time manipulating objects and less time interacting with people alone (Object: $M_{1\text{-year-olds}} = 0.18$; $M_{2\text{-year-olds}} = 0.29$, $t(42) = 3.4$, $p < 0.05$); Person: $M_{1\text{-year-olds}} = 0.21$, $M_{2\text{-year-olds}} = 0.12$, $t(42) = 3.4$, $p < 0.05$); but there was no change over development in the amount of time infants spent engaged in triadic activities (joint and lateral joint, combined) ($M_{1\text{-year-olds}} = 0.17$, SD = 0.09; $M_{2\text{-year-olds}} = 0.18$, SD = 0.10, $t(42) = 0.4$, *n.s.*), as spectator ($M_{1\text{-year-olds}} = 0.18$; $M_{2\text{-year-olds}} = 0.14$, $t(42) = 0.9$, *n.s.* and unengaged ($M_{1\text{-year-olds}} = 0.05$; $M_{2\text{-year-olds}} = 0.06$, $t(42) = 0.5$, *n.s.*).

4 | DISCUSSION

Our analyses yielded three new findings about patterns of attention in caregivers and infants from the Wichi and Eurodescendant communities. First, there was no difference overall in the proportion of time that Wichi and Eurodescendant mothers spent with their infants. What did differ was *how* mothers engaged during this time: Wichi mothers spent a greater proportion of their time observing their infants than did Eurodescendant mothers. Second, there was no difference in the proportion of time that Wichi and Eurodescendant infants spent

engaged in isolated activities. What did differ was *how* they spent this time: Wichi infants tended to *observe* objects and events visible in their environments, whereas Eurodescendant infants tended to *engage* physically with the available objects.

Third, and perhaps most importantly, there was variation in how mother-infant pairs in the two communities coordinated their attention in interactions. All mother-infant pairs engaged in dyadic and triadic attention. What did differ was the *form* of the triadic engagement: Wichi mothers actively observed their infants as the infants engaged with objects, whereas Eurodescendant mothers tended to join more directly with their infants in joint attention episodes. In short, Wichi infant-mother dyads deployed a distinct attentional pattern of interaction.

Together, these findings provide clear evidence that distinct niches for socialization emerge across different cultures.

4.1 | General discussion

The present results, which constitute the first evidence of mother-infant social engagement in an indigenous Wichi community, reveal similarities to engagement in a Eurodescendant community. They also reveal a distinct form of early social triadic interaction among the Wichi, one that to the best of our knowledge, has never before been documented. The findings amplify the view that across the world's communities, mothers deploy different strategies as they engage their infants in joint attention (e.g., Bard et al., 2022; Chavajay & Rogoff, 1999; De León, 2011, 2023; Paradise, 1994; Schieffelin & Ochs, 1986). But these findings also take us further, documenting a specific strategy that Wichi mothers use in triadic interactions with their infants, one that we refer to as "lateral joint attention".

In lateral JE, caregivers use nonverbal channels—gaze, posture, facial expression—to direct their attention from a lateral (non-focal) position to a central point (the child and object). Caregivers are thus 'lateral participants' (see Goffman, 1981, and Clark, 1996), engaging their infants through permeative attention taking part in the interaction without explicitly intervening and, most importantly, without being addressed by the child.

This pattern, consistent with previous evidence highlighting the observational interactions of indigenous caregivers and educators (Paradise, 1994; Rogoff, 1981), is likely a widespread cultural practice. After all, this pattern emerged whether the focus of attention was the infant's activity with an object or the infants' interaction with the caregiver.

It is important to point out that this lateral joint attention emerged from detailed analysis using an observational coding system developed from the current data. This system captured infant-caregiver engagement in each ecological context and revealed how these patterns support coordinated attention in caregiver-infant interactions. More specifically, identifying caregiver practices evident in distal communicative channels—such as eye gaze, facial expression, body posture—permitted us to reconceptualize episodes in which children interacted with objects while being attentively observed rather than exposed to more intrusive interventions. Our coding scheme permits us to interpret these episodes differently than if they had been codified in previous Western-focused coding schemes. That is, we interpret these episodes, previously coded as merely "object-engaged", as evidence of an alternative form of triadic connection, one that illuminates the Wichi's pervasive observational, albeit more distanced, interactional practices.

How can we best account for this new evidence? Certainly, there are myriad differences between the Wichi and Eurodescendant dyads, including differences in their native language, language use, parental education level, socioeconomic status (SES), culturally-held beliefs, knowledge and practices, and access to manufactured artifacts including toys and books. But from our theoretical vantage point, one inspired by the Culture-as-ecosystem approach (Medin et al., 2013) and the Ecological-relational model (Overton & Lerner, 2012), these myriad elements are not independent. Instead, they are interrelated in the richly woven tapestry that constitute the fabric of culture and robustly characterize that particular cultural group on sociocultural time scales, ones that have been acquired through sociocultural processes such as joint-intentionality or shared-expectations, cultural conventionality, and perspective-taking abilities (Ramstead et al., 2016; see Taverna et al., 2022 for a more extended discussion of how this framework applies to observations of the Wichi).

Certainly, there are limitations to the current work. First, as with other work in small or minoritized communities (Brown, 2011; Shneidman & Goldin-Meadow, 2012; among others), our sample size is small, which led us to consider the so-called constraints on generality (Simons, et al., 2017). Working in a small community such as this necessarily places tight constraints on generalizations. However, if the goal is to represent early socialization from a broader perspective that includes greater linguistic and cultural diversity, findings such as those reported here are essential.

Second, this study was focused on one developmental period with infants from 1 to 2 years of age. Extending this observational design to include older children will permit us to gain insight into their developmental path. It will also permit us to investigate whether and how lateral joint attention and joint attention patterns in infancy are related to vocabulary development in young children across different cultural communities. It will also be important to extend this investigation to include mother-infant dyads from other cultural communities. For example, in future work, we plan to compare the current results with a new group of Eurodescendant, Spanish-speaking dyads whose maternal education and SES align more closely with the Wichi we have reported on here.

In summary, the new evidence we report here illustrates how attention and socialization, key mechanisms of early development, are culturally organized. Understanding this cultural organization of socialization practices in infant-caregiver interactions is critical to developing theories strong enough to account for the diversity of communities in which infants grow up. These findings are also important for understanding whether and how culturally defined

social and interactional styles influence later learning at home and in school.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author ethical restrictions.

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ENDNOTES

[1] The *monte* is the characteristic environment of Chaco Forest, composed mainly by herbaceous plains, interspersed with different areas dominated by scrub growth, small woody plants or palm groves.

[2] We considered overall age because our sample does not provide sufficient power to detect differences at each distinct time point.

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