Sophisticated collaboration is common among Mexican-heritage US children

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In light of calls for improving people's skill in collaboration, this paper examines strengths in processes of collaboration of Mexican immigrant children. Sibling pairs (6–10 years old) in California were asked to collaborate in planning the shortest route through a model grocery store. On average, 14 sibling pairs with Mexican Indigenous-heritage backgrounds engaged together collaboratively as an ensemble, making decisions in common and fluidly building on each other's ideas, more often than 16 middle-class European American sibling pairs, who on average more often divided decision making into a solo activity (often ignoring the other or simply bossing the other). Siblings who spent more time collaborating fluidly as an ensemble in the shared planning task were also more likely to collaborate with initiative at home, according to their mothers, which suggests that family socialization practices may contribute to cultural differences in collaboration.

collaboration | culture | child development | decision making | initiative

The importance of learning to collaborate is increasingly noted in domains as widespread as classroom learning and the resolution of worldwide social issues. The National Research Council calls collaboration a 21st century skill that is necessary for children's development (1). Collaboration involves complex cognitive and social processes such as adaptability, perspective-taking, improvisation, self-regulation, and problem-solving skills as children learn to work with group cohesion, improvising with others and addressing conflicting views, to achieve a goal (2–5).

This article examines the possibility that children with backgrounds from Indigenous-heritage communities of the Americas use especially sophisticated processes of collaboration. Their ways of collaborating may illuminate processes of thinking together that may not be as common in middle-class European-heritage communities, where researchers note that collaboration is often not easy for children in middle childhood (2, 6–9), despite the collaborativeness of toddlers (10, 11).

Knowledge of human development urgently needs to move beyond assumptions that the learning, development, and socialization practices of middle-class European-heritage communities are the norm and to examine the strengths of communities with practices that differ from those in dominant, highly schooled communities (12). The present research brings attention to the process of sophisticated collaboration and cultural differences in its use.

It also investigates differences in collaboration between groups that share nationality or ethnicity but whose communities' cultural practices differ. Finally, the research investigates potential contributors to cultural differences in working together with shared thinking or dividing up tasks, from family and community practices and expectations.

Processes of Collaboration and Dividing Decisions

Our study builds on research on cultural differences in the extent of collaboration, to investigate several distinct processes of collaboration that involve shared thinking and making decisions together (13). A growing body of research indicates that collaboration often occurs to a greater extent among children with Indigenous backgrounds in Guatemala, Mexico, and the United States than among children from families in those same countries with extensive Western schooling and related middle-class practices, who often compete or show a lack of connection (14–19).

Focusing on processes of collaboration, our research distinguishes three forms of collaboration that all involve thinking together. Our particular interest is in an especially sophisticated process of collaboration—fluid collaboration as an ensemble—which involves making decisions together with flexible leadership, mutually building on each other's ideas.

Several ethnographic studies have noted impressive fluidity of roles and flexibility in building on others' ideas in Indigenous communities of the United States and Mexico. For example, Mazahua children engaged in sophisticated fluid collaboration as they smoothly interchanged acting and observing roles with other children, parents, and teachers in constructing market stalls or new classrooms, as one person or another saw a way to make progress in the endeavor, with no apparent disagreements or negotiations (20–22).

Rogoff and colleagues theorize that a collaborative way of organizing learning, Learning by Observing and Pitching In to family and community endeavors (LOPI) (23–26), is especially prevalent in Indigenous-heritage communities of the Americas. Consistent with the LOPI model, fluid collaboration appears both in the organization of small-group interaction and in the overall organization of many Indigenous American communities (14, 22, 27–30), with "flexible leadership as the people involved coordinate fluidly with each other. Learners are trusted to take initiative along with the others as everyone fluidly blends their ideas and agendas" (ref. 26, p. 74). Building on the LOPI model and previous research, we and others have defined "fluid collaboration as an ensemble" as flexible coordination in which partners build on each others' ideas to develop decisions with shared, pliant leadership (14, 19).

The few studies that have examined cultural differences in the extent of fluid collaboration as an ensemble have not distinguished this type of collaboration from others. In one study, children from Mexican Indigenous-heritage backgrounds coordinated their actions together as a triad, while folding origami

figures, more often than middle-class (Mexican-heritage or European American) children, who more often worked dyadically or individually (19). Similarly, Guatemalan mothers who followed relatively traditional Mayan practices and their three children collaborated as an ensemble more often than did Mayan family groups with extensive Western schooling and related practices, who more often divided into subgroups working on different aspects of assembling a puzzle (14). Navajo 9-y-old dyads instructing a younger child how to play a game were more likely to be attentive to each other's efforts and extend or support the information given by their peer than European American children, who often became inattentive when their partner took the lead and simply repeated statements or made statements unrelated to their peer's statements (16).

The present research distinguishes fluid collaboration as an ensemble from two other forms of collaboration: collaboratively negotiating agreement and one child collaboratively leading decisions. We expected Indigenous-background Mexican-heritage US sibling pairs to use more fluid collaboration as an ensemble than middle-class European American pairs in a shared planning task; we did not have predictions of cultural differences in the other two forms of collaboration.

We are also interested in the processes involved when children do not share ideas and make decisions together in a joint task. Research has not examined children's ways of not collaborating, other than noting the frequent use of turn-taking to divide and regulate access to resources in middle-class European American families (16, 30, 31). We posit that children in middle-class/highly schooled communities commonly divide up decision making, thereby not thinking together. We distinguish decision making by one child who excludes or bosses the other (who has no involvement in the decision making) and separate decision making in which one or both children ignore the other while planning.

Questions of the Generality of Cultural Practices

Rogoff (26) has speculated that the pattern described by LOPI may be prevalent in many Indigenous communities of North, Central, and South America, based on ethnographic and comparative studies done in some communities across these continents. Rogoff and coworkers (30) speculate that LOPI may also be common, although perhaps attenuated, in many families who have roots in Indigenous communities but who no longer live in such communities, such as the immigrants to California from regions of Mexico with strong Indigenous histories and limited Western schooling who participated in the present research.

People who migrate provide a test of generality and culture change—a sort of cross-sectional historical analysis—as they engage in several cultural lifeways (e.g., engaging in both Indigenous Mexican and US middle-class practices). To examine this, we included an exploratory analysis of the interactions of US sibling pairs whose families have experience with both Mexican Indigenous heritage practices and Western schooling and related practices. Prior studies on various aspects of LOPI (14, 19, 32, 33) suggest that they may show a mixed pattern of collaborating fluidly as an ensemble and dividing decision making.

The study thus contributes an empirical test of the extent of generalizability of cultural patterns, using an approach that conceives of culture as the ways of living—the practices—of communities, which may or may not be shared across communities with the same ethnicity or nationality (34). This approach contrasts with the common approach in social science research that equates culture with nationality or ethnicity and makes assumptions that individuals from widely different communities within nations or ethnic groups are the same (19, 34).

Our designations of cultural backgrounds (e.g., US Indigenous-heritage Mexican with extensive experience of Western schooling) are descriptors of communities that often share practices, not ethnic or national social addresses that could be treated as isolated variables (34). Our approach focuses on children's participation in constellations of cultural practices (35–37), which vary among cultural communities such as Indigenous-heritage Mexican immigrants to the United States and middle-class European Americans. Indeed, those backgrounds differ in numerous cultural practices, not only family involvement in Western schooling and Indigenous ways of learning but also in which languages are spoken, family size and structure, family occupations and religion, access to resources, and dozens of others. Our aim is to understand distinct forms of collaboration, and LOPI, as they fit with a constellation of cultural practices, as a pattern, which would make the isolation of cultural practices from each other as separate variables counterproductive.

Contributors to Cultural Differences in Collaboration

Our study also investigated possible contributions to children's learning of the expected patterns of working together, from their experiences at home. We asked whether fluid collaboration as an ensemble in the planning task would relate to their collaborative initiative in helping at home and to cultural values regarding collaborative initiative.

A number of studies note that Mexican-heritage and Indigenous American children often collaborate with initiative in household work and community events. These observations contrast with research finding that middle-class children show limited collaboration in the household, often helping only when adults get them to complete solo chores (20, 28, 38–43). We expected that children whose mothers report that they collaborate with initiative in household work would engage in more fluid collaboration as an ensemble with their sibling in the shared planning task.

We also examined whether more Mexican-heritage mothers than middle-class European American mothers would regard helping at home without being asked as an important expectation for child development. The Mexican value of being *acomedido*, helping without being asked by being attentive to the direction of the group, a key aspect of LOPI, may encourage collaboration broadly (26, 30, 44).

We describe the methods and results in two sections. Section 1 examines the sibling pairs' collaboration or divided decision making in a shared planning task. Section 2 explores possible contributors to children's collaboration in or dividing of decision making: Children's collaboration in household work and mothers' expectations regarding children's collaborative initiative at home.

Section 1. Collaboration or Dividing Decisions in a Shared Planning Task

The primary question is whether US Mexican Indigenous-heritage sibling pairs would use more fluid collaboration as an ensemble in a shared planning task than middle-class European American sibling pairs, who in turn would use more division of decision making. (We did not have predictions for the other forms of collaboration.) Secondarily we consider, on an exploratory basis, the pattern for siblings whose families have extensive experience with both Mexican heritage and Western schooling.

Methods

Procedures were approved by the University of California, Santa Cruz Institutional Review Board; informed consent was obtained from all participants. Readers can access data, protocols, and coding systems by contacting L.A.

Participants. Participants were 43 sibling pairs between 6 and 10 y of age, with similar proportions of girl/girl, boy/boy, and mixed-gender pairs (for gender details, see *SI Appendix*). They came from three cultural backgrounds in the Central Coast of California:

The US Mexican Indigenous-heritage participants were 14 pairs of siblings (averaging 9.5 and 6.8 y of age) whose families likely have some experience with Indigenous Mexican practices, based on the region of Mexico from which the family came, and limited experience with Western schooling. Previous studies have used family schooling as an index of familiarity with Indigenous

practices among immigrants from certain regions of Mexico where Indigenous communities have had limited access to schooling (15, 30, 37, 40, 45). All the parents were immigrants from Mexico, mostly from the states of Jalisco, Oaxaca, Michoacán, Chihuahua, and Guanajuato. The families had limited experience with Western schooling across generations [mothers reported having fewer than 12 grades of schooling; mean (M) = 7.9 grades], and when they knew their own parents' schooling, they reported an average of four grades of schooling] and were employed in occupations such as housecleaner, gardener, restaurant worker, construction worker, and agricultural worker.

The middle-class European American participants were 16 sibling pairs (averaging 9.4 and 7.3 y of age) of European American background whose families have extensive experience with Western schooling across several generations [mothers had 12 grades or more of schooling (M = 16.2 grades) and reported an average of 14 grades of schooling for their own parents] and were employed in occupations such as teacher, accountant, doctor, nurse, social worker, principal, engineer, scientist, and business person.

Our secondary, exploratory analysis compares the sibling pairs from the two primary backgrounds described above with 13 sibling pairs (averaging 9.2 and 6.6 y of age) from highly schooled Mexican families living in California to examine the generality of the cultural pattern and possible modifications of heritage cultural practices among children with experience in several cultural paradigms. We termed these US Mexican-heritage families with extensive Western schooling "*Nepantla*," a Nahuatl word for being in the middle, negotiating two ways of life (46). The *Nepantla* sibling pairs were from Mexican immigrant families with extensive Western schooling and related experience in the mothers' generation but not the grandparents' generation. The mothers had completed at least 12 grades of schooling (M = 13.2); those who knew their own parents' schooling reported three to six grades of schooling. Most of the mothers had emigrated from similar states of Mexico as the US Mexican Indigenous-heritage parents and had a range of occupations including educator, writer, social worker, cook, housecleaner, landscaper, dispatcher, restaurant worker, engineer, construction worker, and curator.

Collaborative Planning Task Procedure. The sibling pairs were asked both (*i*) to work together and to help each other and (*ii*) to plan an efficient route through a model grocery store for a toy "shopper" (a small plastic figure). The tabletop model grocery store [based on a study by Gauvain and Rogoff (3)] had 111 pictures of grocery products displayed on 14 "shelves" along the aisles and the inside walls of the store (Fig. 1).

The videotaped sessions took place in the family's home in the participants' language(s) of choice, without other siblings or mothers present. A bilingual research assistant (unaware of the hypotheses) led the sessions, starting with a 2- to 3-min warm-up conversation to allow children to become comfortable. To begin the collaborative planning task, the children were encouraged to look around the model grocery store at the grocery items, and they made a practice shopping trip with a short list. Then they were told that they would plan five shopping trips to take the "shopper" to the store to buy groceries and that the shopper had sore feet, so they needed to create the shortest route to get the items on her list. The grocery lists consisted of duplicates of the items in the store pasted on 2 × 2 in cards; the children were asked to plan the order for picking up the items by placing the cards on a cardholder (2.5 × 11 in). The grocery lists for the five shopping trips were presented in standard order across participants.

The task was carefully designed and extensively piloted to encourage collaboration and to be challenging but not too difficult: In each of the five shopping trips, to ensure that both children had some familiarity and practice with items of the shared list, the sibling pairs were first asked to plan routes individually for separate five-item shopping lists (which included some overlapping items) and then were asked to work together to plan a nine-item shared list. The shared nine-item list included four overlapping items from the original individual lists, four items that only one child had had on the original list, and one new item. (After laying out their joint plan on the cardholder, the pair took the shopper on the route she would use to fetch the grocery items, picking up each item and placing it on a "shopping cart," a different cardholder.)

We coded the videotapes of the five nine-item shared shopping trips (when the pair was asked to work together) with a coding scheme we developed based on ethnographic analysis of the cases and suggestions from previous research on children's interactions (14, 19, 30). The five joint planning trips were coded in 10-s segments using four mutually exclusive main codes: (*i*) fluid collaboration as an ensemble, (*ii*) collaboratively coming to agreement, (*iii*) collaborating with one sibling leading, and (*iv*) dividing decisions. The first three codes are forms of collaboration; the dividing decisions code was further distinguished in several subcodes.
Fluid collaboration as an ensemble. Siblings work together with flexible coordination building on each other's ideas with shared decision making and

Fig. 1. Siblings planning the shopper's route for groceries that were presented on small square cards that can be seen near the children. This pair's developing route plan can be seen in the grocery cards placed in sequence of the shopping trip on the long cardholders on the table.

pliant leadership. Both siblings contribute to creating the plan, attentively building on each other's ideas with suppleness and anticipating each other's actions. It seems as if "four hands are working together as one organism" without getting in each other's way, as A. Dayton put it (47). If they briefly take separate roles (e.g., as observer and doer) for a second or two, they shift roles smoothly without stopping and restarting action and without designating a leader. Fig. 1 shows a pair who worked in fluid collaboration as an ensemble with continual mutuality in decision making throughout the five trials.
Collaboratively negotiating agreement. The pair collaborates productively in trying to negotiate obstacles to agreement emanating from their individual approaches to the task. For example, they suggest how to do the task better and come to agreement on the route.
Collaborating with one sibling leading. Both children pay attention to each other, thinking together, although one clearly leads the collaborative planning during the 10-s segment. For example, the older sibling organizes the cards to develop a plan, explaining to the younger child what she is doing, consulting the younger child, who observes with interest or simply nods in agreement.
Dividing decision making. The children do not collaborate; their decisions are solo or unilateral rather than shared. We coded each sibling separately in six mutually exclusive subcategories of dividing decision making:

Bossy/excludes: One child purposely tries to exclude the other, preventing access to materials or telling the sibling what to do in an imperious manner, without allowing the sibling to contribute beyond following orders.

Implement the plan: In the context of the other child's being bossy, a child implements the plan created by the bossing sibling, not contributing to or engaging in decisions, like a robot, waiting for instructions on what to do next.

Planning child ignores the sibling: A child ignores the sibling while working on the plan. Both children may ignore each other, planning side by side without collaborating in decisions, without conflict.

One child tries to enter into the planning: A sibling not working directly on the task tries to contribute to planning, e.g., by suggesting how to do the task, but has no success in getting involved; the other child could be bossing/excluding or ignoring.

Overt conflict: Overt conflict includes arguments trying to impose one's own plan, dismissing the sibling's contributions, interrupting, grabbing cards out of the sibling's hands without consent, or pushing the sibling away to prevent access. It is stronger than the conflict involved in excluding a sibling who tries to enter into decision making.

Anyone off-task: Either child (or both) is not engaged, not paying attention to the planning task.

Reliability. The primary coding was done by L.A., and for reliability a bilingual research unaware of the hypotheses of the study coded 30% of the data. Interobserver reliability was calculated using Pearson's *r* correlation: fluid collaboration as an ensemble ($r = 0.93$), collaboratively negotiating agreement ($r = 0.96$), collaborating with one child leading ($r = 0.80$), and dividing decisions ($r = 0.81$), with the subcategories: one child being bossy/excluding ($r = 0.96$); implement plan ($r = 0.80$); a planning child ignores sibling ($r = 0.90$); one child tries to enter into the plannng ($r = 0.77$); overt conflict ($r = 0.93$); and anyone off-task ($r = 0.95$).

Primary Results: Sibling Collaboration in the Shared Planning Task

Background Analyses. All pairs completed the task, and the siblings from both US Mexican Indigenous-heritage and middle-class European American backgrounds averaged 109 10-s planning segments (range = 64–178 segments, SD = 26.4; about 18 min). Given the variation in the number of minutes the pairs took to complete the shopping trips, analyses were based on the proportions of total segments across the five trials. No age differences and only one minor gender difference were found: Brother–sister dyads spent more segments with both children ignoring the other ($M = 3.85$, SD = 5.34) than dyads composed of two brothers ($M = 0.71$, SD = 1.29) or two sisters ($M = 0.85$, SD = 0.94), $F(2, 40) = 3.39$, $P = 0.04$.

Although our interest is in children's collaboration, as a key developmental skill, we also examined the children's routes. The children had been given two task goals: to work together and to help each other create the shortest route. There were no significant differences in route length between the US Mexican Indigenous-heritage and middle-class European American pairs in an analysis of covariance controlling for younger siblings' age. However, we noted informally that some middle-class European American older siblings tended to take over the task, not including the younger child in decision making, perhaps prioritizing the creation of an efficient route, whereas US Mexican Indigenous-heritage older siblings sometimes went out of their way to include the younger child in decisions, even at the expense of a shorter route, apparently prioritizing the goal of collaboration.

We first provide results of the primary comparison, to determine whether US Mexican Indigenous-heritage children worked in fluid collaboration as an ensemble more than middle-class European American children and whether the latter more often divided decision making. One-tailed *t* tests were used for these directional predictions; because we did not have predictions for the other two forms of collaboration, they were examined with two-tailed tests.

We then turn to the exploratory analyses of the *Nepantla* pairs, whose families had experience of both Western practices (especially schooling) and probable Indigenous practices. These exploratory analyses used two-tailed *t* tests. (The results are the same whether a *P* level of 0.05 or a more conservative *P* level of 0.01 is employed.)

Fluid Collaboration as an Ensemble. US Mexican Indigenous-heritage pairs on average collaborated fluidly as an ensemble in more than half of the segments (53%), more than twice as often as the middle-class European American children, who on average did so in only 25% of the segments, a significant difference (Table 1).

In fact, 4 of the 14 US Mexican Indigenous-heritage dyads used some form of collaboration exclusively and primarily collaborated fluidly as an ensemble throughout the five trials. No middle-class European American pair did so, and 4 of the 16 European American dyads never collaborated fluidly as an ensemble (see the casegraph showing the patterns, in Fig. 2).

Collaboratively Negotiating Agreement and Collaborating with One Sibling Leading. Children of both backgrounds spent an average of about 14–16% of the time engaged in each of these two forms of collaboration, with no significant differences (Table 1).

Dividing Decision Making. Middle-class European American sibling pairs on average used dividing decision making in almost half the segments (44%); this was almost three times the average proportion of segments in which the US Mexican Indigenous-heritage sibling pairs did so (16%), a significant difference (Table 1). As shown in the casegraphs of Fig. 2, half (8 of 16) of the middle-class European American pairs divided decision making in more than 45% of the session, and only 1 of the 14 US Mexican Indigenous-heritage pairs did so.

As detailed below, the most common ways of dividing decisions by the middle-class European American pairs involved solo decision making: One child acted as boss or excluded the other child, or one child (or both) ignored the sibling while planning. *Bossy/excludes.* Over 20% of the segments in the middle-class European American pairs were spent by one child (usually the older) bossing or excluding the other, whereas only 4% of the segments for the US Mexican Indigenous-heritage pairs were spent this way, a significant difference.

Usually the other child simply implemented the bossing child's plan, often not paying attention while the bossing child developed the plan; this was six times more common among the middle-class European American pairs than among the US Mexican Indigenous-heritage pairs [in 13% vs. 2% of the segments, respectively, $t(28) = 3.27$, $P < 0.003$; in the remaining segments an excluded child often tried unsuccessfully to get into the planning].

Table 1. Mean (and SD) percentage of segments that the pairs spent engaging in different ways of working together during the planning task, with statistics comparing US Mexican Indigenous-heritage and middle-class European American pairs

Ways of working together	US Mexican Indigenous heritage	Middle-class European American	t(28)	P	Cohen's d	Exploratory Nepantla
Fluid collaboration, % (SD)	53.42 (25.33)	25.33 (25.59)	3.01	0.002	1.13	41.49 (27.70)
Negotiate, % (SD)	14.78 (9.56)	14.33 (11.43)	0.11	ns		11.26 (6.93)
One leads collaboration, % (SD)	16.60 (13.29)	15.69 (11.33)	0.20	ns		16.61 (8.84)
Divide decisions, % (SD)	15.76 (14.49)	44.50 (31.49)	3.27	0.004	−1.23	30.38 (25.95)
Bossy/excludes, % (SD)	4.44 (5.22)	21.28 (18.82)	3.42	0.003	−1.29	7.28 (8.21)*
One ignores the other, % (SD)	6.44 (10.32)	18.81 (20.55)	2.12	0.025	−0.80	13.86 (16.33)
Both ignore each other, % (SD)	0.84 (2.23)	3.66 (5.63)	1.84	0.05	−0.69	2.12 (2.87)
One tries to enter into decision making, % (SD)	2.10 (2.11)	6.64 (7.49)	2.32	0.03	−0.87	2.44 (3.75)
Overt conflict, % (SD)	1.12 (1.89)	3.11 (5.63)	1.25	ns		3.00 (6.00)
Going off-task, % (SD)	6.23 (10.96)	10.60 (14.50)	0.93	ns		12.91 (19.06)

Subcategories do not equal total dividing decisions; the subcategories both ignore and overt conflict involve both siblings; other subcategories involve just one. ns, not significant.
Nepantla pairs had a lower percentage of bossy/excludes segments than middle-class European American pairs, $t(27) = 2.61$, $P = 0.02$.
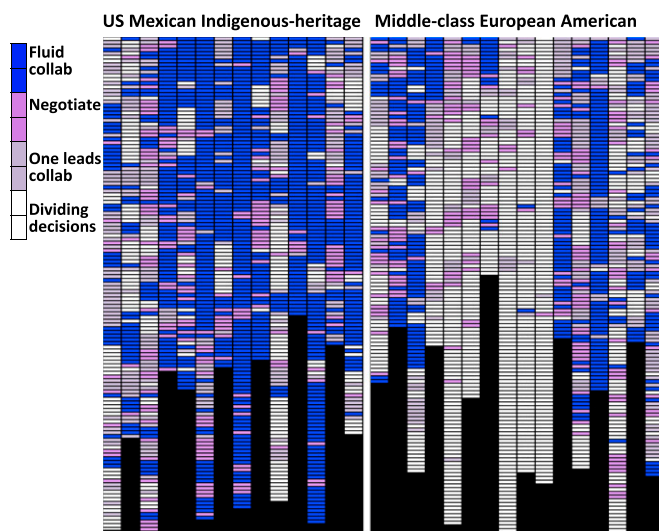
Fig. 2. Casegraphs showing distinct patterns and variability in working together. Each column is a sibling pair, through the 10-s segments of their planning session. Casegraphs maintain fidelity to individual cases while conveying quantitative information (33).

Ignoring the other child while working on the plan. Middle-class European American siblings often ignored their sibling while working on the plan and did so at least three times as much as US Mexican Indigenous-heritage siblings. In 18% vs. 6% of the segments, respectively, one child (usually the older child) ignored the other, and in 3% versus <1% of the segments, respectively, both children ignored each other (working side by side on different parts of the plan with no attempt to collaborate; the differences are significant.

One child tries to enter into the planning. Middle-class European American siblings more often tried unsuccessfully to enter into the planning than was the case for the US Mexican Indigenous-heritage siblings (in 8% vs. 2% of the segments, respectively), $t(28) = 2.32$, $P < 0.03$. (Because the reliability for this subcategory was marginal, we do not analyze it further.)

Overt conflict. Overt conflict—more conflictual than simply trying unsuccessfully to get in to the activity—was rare in both backgrounds (1% and 3% of the segments, respectively); the difference was not significant.

Going off-task. Going off-task occurred in 6–10% of segments, usually while a child was being ignored or had been pushed away, with no difference between backgrounds.

In sum, collaborating fluidly as an ensemble was the most common pattern for the US Mexican Indigenous-heritage siblings, whereas dividing decision making, usually by being bossy/excluding or ignoring the sibling while working on the plan, was the most frequent pattern for the middle-class European American pairs. The two backgrounds were similar in the extent of the two other forms of collaboration (collaboratively negotiating agreement and collaborating with one sibling leading).

Although the contrasting patterns were strong, as seen in the casegraphs of Fig. 2, several children of each background did not follow the predominant pattern of their background group. Our exploratory analysis below examines variability related to cultural experience by focusing on children whose family experience includes both Mexican heritage and extensive Western schooling (and associated middle-class practices), i.e., the *Nepantla* cohort.

Exploratory Results: Collaboration of *Nepantla* Siblings
Consistent with their family experience of several cultural systems, sibling pairs from the *Nepantla* background showed a mixed pattern of collaboration in the planning task, with

performance usually falling between the US Mexican Indigenous-heritage and middle-class European American backgrounds and no significant differences with either (Table 1).

Siblings from the *Nepantla* background collaborated fluidly as an ensemble in a slightly but not significantly higher proportion of segments than middle-class European American siblings, $t(27) = 1.67$, $P < 0.10$, and in a nonsignificantly lower proportion of segments than US Mexican Indigenous-heritage siblings. Collaborating fluidly as an ensemble characterized at least 45% of the segments among six *Nepantla* pairs, a pattern falling between the nine Mexican Indigenous-heritage siblings and four middle-class European American siblings who did so. In the other two forms of collaboration there were no significant differences between the *Nepantla* pairs and the pairs from the other two backgrounds.

A similar mixed pattern was found for dividing decision making, with *Nepantla* siblings dividing decision making non-significantly more, $t(25) = 1.78$, $P < 0.09$, than US Mexican Indigenous-heritage siblings and showing no significant differences from middle-class European American siblings (Table 1). Dividing decision making characterized at least 45% of the segments among four *Nepantla* pairs, a pattern falling between one US Mexican Indigenous-heritage pair and eight middle-class European American pairs. In most subcategories of dividing decision making, *Nepantla* pairs did not differ significantly from the other two backgrounds, with values usually falling between the other backgrounds. The only significant difference still fits the overall pattern.

Section 2. Possible Contributions from Collaboration at Home and Cultural Values
We turn now to the question of whether cultural differences in children's collaboration in the planning task might relate to collaborating in family household work on their own collaborative initiative versus doing so under control by adults. Participation in household work has been suggested as providing children with opportunities to learn to collaborate and be prosocial (48, 49). We also examined mothers' expectations for collaborative initiative at home.

Procedure: Collaborative Initiative or Adult Control at Home. Each child's collaboration at home was reported by mothers in the mother's language of preference in a semistructured, conversational interview, slightly adapted from previous studies (38, 39). The initial question was "What do your children do to help around the house?" Follow up questions, using the most complex household task mentioned by the mother, explored the extent to which each child collaborated with initiative ("Does the child independently take responsibility for doing this task?") or only carried out work under adult control ("Do you sometimes have to persuade or convince them to do it? Do they receive a reward for doing it? Are they punished if they don't do it?").

The interview data were collected a few months before our planning task. Interview data are missing for four of the families that were included in the planning task, yielding 13 US Mexican Indigenous-heritage, 13 *Nepantla*, and 13 middle-class European American pairs.

Coding: Collaborative Initiative or Adult Control at Home. We first coded the mothers' responses in terms of each child's reported collaborative initiative and adult control, as well as the complexity of their contributions. Collaborative initiative involves regular voluntary contributions to family work, with children willingly pitching in on their own initiative without adults requesting or pressing the child to help; the child notices work that needs to be done and gets it done. Adult control involves adults providing a contract or reward or managing the child's work, often an individual chore, e.g., with chore charts, struggle and negotiation, arguments, and nagging. The complexity of the contributions to family household work was coded using a three-level scale (developed in ref. 37). For

example, cooking and cleaning the bathroom are level 3, washing the family's clothes is level 2, and sweeping is level 1.

We then combined the coding of the mother's reports on each child to develop two scales that summarize the sibling pair's collaborative initiative and adult control of their household work. (The two siblings had similar reports of collaborative initiative and adult control.) The children's collaborative initiative scale took into account the range and complexity of their voluntary contributions, to distinguish pitching in to perform minimal vs. very responsible work. It ranged from 0 (minimal work with no initiative, just adult control) to 8 (regularly voluntarily carrying out complex household work without adult control). The adult control scale ranged from 0 (no adult control) to 2 (work done with adult control and no collaborative initiative). The scales are detailed in *SI Appendix*.

Primary coding was done by L.A. and A.L.F. For reliability, a bilingual assistant blind to the hypotheses coded one-third of the data. Reliability between the blind coder and the other two coders was excellent for both scales ($r = 0.93$ and $k = 0.80$).

Results: Relation Between Ways of Engaging at Home and in the Planning Task.

Background analyses of cultural differences in ways of contributing at home fit the pattern found in refs. 38 and 39. Mexican-heritage sibling pairs were reported to collaborate with initiative at home more regularly than middle-class European American pairs (Ms = 4.63 vs. 1.18, respectively, on our 0–8 scale; SDs = 2.7 and 1.7, respectively), $t(37) = 4.44$, $P < 0.001$. Middle-class European American pairs were reported to contribute to household work based on adult control more than Mexican-heritage siblings (Ms = 1.65 and 0.73, respectively, on our 0–2 scale; SDs = 0.59 and 0.73, respectively), $t(37) = 4.00$, $P < 0.001$. The two Mexican-heritage backgrounds did not differ.

As expected, sibling pairs who were reported to collaborate on their own initiative in family household work, without being asked, were more likely to collaborate fluidly as an ensemble in the planning task ($r = 0.44$, $P = 0.007$, combining the three backgrounds). In turn, sibling pairs whose chores at home were reported to be based largely on adult control more often divided decision making into a solo activity, with one child bossing and the other simply implementing the plan ($r = 0.48$, $P = 0.002$; nonparametric tests showed similar correlations). There were no other significant correlations between the pairs' ways of contributing at home and in the planning task.

The relation between collaboration at home and in the planning task was primarily related to the children's cultural backgrounds. When cultural background is controlled for with partial correlations, the significant correlations given above between ways of engaging at home and in the planning task become marginal: $r = 0.21$, $P = 0.10$ and $r = 0.29$, $P = 0.07$, respectively. The sibling pairs generally collaborated either in both places or in neither, following a similar approach across the two situations, and their approaches clustered by cultural background. The US Mexican Indigenous-heritage siblings (and to some extent, the *Nepantla* pairs) tended to pitch in voluntarily, collaborating at home, and to collaborate with each other fluidly in the planning task. The middle-class European American pairs tended to rely on adult control for their contributions to household work and to divide decision making into solo planning (often with one child controlling), not collaborating. Details of the cluster results are in *SI Appendix*.

Cultural Values and Expectations of Collaboration Without Being Asked.

We explored the role of mothers' cultural values and expectations to collaborate by asking, "Is it important for you that children help without being asked?" We also examined the mothers' reasons if they provided any.

All 26 Mexican-heritage mothers from both backgrounds reported that it was important that children help without being asked. For example, "For me it is very important . . . to help, spontaneously help with something. There are kids that don't do that. I am very pleased

that when we go to Mexico, that my daughter pitches in. She helps my mom clean her house, clean the bathroom, sweep, and I like that they see how they can help" [our translation].

In fact, 42% of the Mexican-heritage mothers (four US Mexican Indigenous-heritage and seven *Nepantla* mothers) volunteered that it was beyond important for children to help without being asked—it was expected. (Their children's approaches to the two situations did not differ in any obvious way from those of the other Mexican background children.) Some US Mexican Indigenous-heritage mothers stated that there was no merit in helping only when asked, and therefore it is important for a mother not to assign work. For example, "It is important because that way, one knows that helping is coming from them ('*les nace del corazón acomedirse*,' 'it is born from their heart to help without being asked') and that there's no need to be telling them 'Take the trash out, mop, clean.' And they by themselves are starting to help."

None of the middle-class European American mothers said that helping without being asked is not only important but is simply expected—unlike the 42% of the US Mexican-heritage mothers who volunteered this, $\chi^2(1, N = 39) = 7.66$, $P = 0.006$. In fact, 31% (4 of the 13) middle-class European American mothers but none of the Mexican-heritage mothers reported that it is not expected or important or even realistic for children to help without being asked, $\chi^2(1, N = 39) = 9.23$, $P = 0.002$. For example, "I can't even imagine! Like, kids just doing chores without being asked?! That sounds very strange to me!" (These four mothers' children used very little fluid collaboration as an ensemble in the planning task, averaging 13% of the time segments compared with 33% for the other nine middle-class European American children, and usually divided decisions, in 54% vs. 31% of segments.)

The comments of the mothers who said that helping without being asked is important also had a different flavor in the two cultural backgrounds. Of the 26 Mexican-heritage mothers who said this, 12 focused on the importance of children's help without being asked, for the benefit of other people, and only one focused only on the children cleaning their own room. But of the nine middle-class European American mothers, only one focused on children helping other people, and two focused on self-care (cleaning up their own mess or packing their own backpack). Further, two of the nine middle-class European American mothers who thought it was important indicated that their children were too young to actually help without being asked; none of the 26 Mexican-heritage mothers said this, and one mentioned the importance of children learning this from the beginning.

Many of the Mexican-heritage mothers described helping without being asked in moral or social terms. Three explicitly said that it is important for being good, moral people, and seven explained that helping other people without being asked helps people be well received and appreciated everywhere. For example, "I always tell them, 'My parents always told us, be *acomedidos* — wherever you go, there will always be a place for you.' . . . My dad always said, 'Even if people don't have enough food, but if you get there and help without being asked, they will share their food with you.'" No middle-class European American mothers mentioned any moral, social, or community-minded reasons for helping out.

In sum, the mothers' cultural values and expectations of children's collaboration without being asked fit with the patterns that their children showed in their ways of being involved in household work and in the planning task.

General Discussion

Our primary finding was that in the planning task US Mexican Indigenous-heritage sibling pairs spent twice as much time as middle-class European American children in collaborating fluidly as an ensemble, blending agendas in a flexible and coordinated fashion. Our findings extend previous research by distinguishing fluid collaboration as an ensemble from two other

collaborative approaches—negotiating agreement and one partner collaboratively leading while the other observes and agrees—in which there were no differences between backgrounds.

It is notable that when the middle-class European American siblings did collaborate, they tended to do so through negotiating agreement or with one leading (in about 30% of segments; to a similar extent as the US Mexican Indigenous-heritage siblings, who did so in 31% of segments). They collaborated fluidly as an ensemble in only 25% of segments, half as much as the 53% among the US Mexican Indigenous-heritage siblings).

The middle-class European American siblings most commonly divided the shared task into solo decision making (44% of the time). This was almost three times more than the US Mexican Indigenous-heritage siblings (16%). Our study extends previous research by documenting how the middle-class European American children divided decisions: One common way was for one child to make the decisions and give orders to the sibling, who simply implemented the plan without participating in decision making. Another was for one child (or both) to ignore the other while working on the plan; the other child often unsuccessfully attempted to be part of the planning.

The study also contributes to an understanding of the generality of cultural practices in communities with the same ethnic/national label but with distinct cultural experiences. In line with previous studies that found that children involved in two cultural approaches may use some of the attentional and interactional practices of each cultural system (14, 19, 32), the US Mexican-heritage sibling pairs whose mothers had extensive Western schooling collaborated fluidly as an ensemble and divided decision making to an extent that fell between the patterns of the other two groups. This finding underlines the importance of not assuming generality on the basis of ethnic labels. In addition, it suggests that children may adapt some of their practices with family experience in multiple distinct cultural systems.

Relation of Collaboration in the Household and Collaboration in the Planning Task. Collaborating in both household work and in the planning task was the usual pattern for the US Mexican Indigenous-heritage children, whereas for the middle-class European American children the usual pattern was adult control at home and making solo decisions in the shared planning task, often with the older child making the decisions and bossing the younger, who simply carried out orders. Children whose families had both US Mexican heritage and extensive Western schooling followed a mixed pattern that seemed closer to their counterparts with Mexican heritage than to their counterparts with extensive family schooling.

Although correlational, these findings support the idea that children's collaboration at home on their own initiative might serve as a model for collaborating in other contexts, by learning to skillfully share thinking and flexibly build on each other's ideas. Likewise, if children are used to adults controlling their contributions to household work, they might learn to engage with their sibling with one bossing and the other implementing orders.

Cultural Values, Expectations, and Practices. The expectation and importance given to collaborating with initiative in family household work by the Mexican-heritage mothers may contribute to a collaborative approach among their children. This would fit with the Mexican value system that emphasizes pitching in with initiative—being *acomedida/o*—as an important childrearing goal (30). The Mexican-background mothers' statements prioritized children's contributing to something greater than themselves with agency and initiative. [Their views express interdependence with autonomy, challenging the widespread dichotomy of individualist versus collectivist societies (34, 50).]

Our findings fit with the conceptual model of Learning by Observing and Pitching In to family and community endeavors (LOPI) (26) and support the idea that LOPI may be prevalent among children with backgrounds stemming from Indigenous communities of the Americas. In the LOPI conceptual model, not only is social interaction organized collaboratively between individuals directly engaged together; collaboration is also how communities organize social relations more generally (28, 29). In many Mexican Indigenous-heritage communities children as well as adults collaborate to achieve a community goal, such as planning community-wide ceremonies or events, with flexibility and without the need to have roles or duties assigned (23, 29, 51). Children are valued as bona fide contributors who pitch in when they have something to offer (26, 52, 53).

Such societal-level collaborativeness is uncommon in middle-class communities that segregate children from community life and reserve many endeavors for adults, thereby dividing communities into an adult world and a child world (24, 52). Children who are excluded from responsible roles in mature family and community activities have limited everyday opportunities and expectations to learn responsible collaboration (26, 28, 30). They are often segregated into specialized child-focused situations controlled by adults, which may encourage children to divide responsibilities into solo tasks—even when asked to work together—and to engage in hierarchical unilateral relations like we saw in our study (38, 40, 54).

Thus, the approaches taken by the middle-class European American children, like those of the US Mexican Indigenous-heritage children, seem to fit with the multifaceted systems—constellations—of practices and values of their families and communities (26, 36). Their approaches are not isolated variables separate from other aspects of people's lifeworlds. At the same time, individuals and communities can learn from each other, adapting practices from other communities and expanding their repertoires of practices to enable them to flexibly navigate the always-changing situations of their lives (34, 35, 55).

The ability to collaborate, building on others' ideas and contributions, is crucial in children's development (56) and is increasingly called for by higher education and employers (1, 57). We found sophisticated fluid collaboration as an ensemble in our planning task and collaboration with initiative at home to be common among US Mexican Indigenous-heritage children. Fluid collaboration as an ensemble was less common among the middle-class European American children in our task, even though we asked children to work together in creating an efficient route, and they seldom used collaborative initiative at home. We argue that it would be valuable for middle-class children to use the valuable skills involved in fluid collaboration as an ensemble more often, especially in situations like our planning task that called for working together, and to contribute with collaborative initiative at home.

We take an additive perspective (58) that argues that people benefit from broadening their repertoires of practices by developing skills to adapt to different circumstances (12, 34, 55). Our planning task and instructions called for children to collaborate, but other situations call for children to compete or to make decisions separately (13, 59). As an anonymous reviewer suggested, adult life in many middle-class European American communities often also involves division of labor into solo tasks. Thus, we are not arguing for middle-class European American families to abandon their ways but to expand them. We believe that all people benefit from knowing how to do things more than one way, building on their strengths (12, 34), especially if their lives involve diverse situations, as is increasingly the case for children worldwide.

If institutions serving children expand on the institution's repertoires to build on the skills and practices that children bring from home, including some children's fluid collaboration and helping without being asked, this may help children expand their repertoires and institutions move beyond deficit models (12, 60). In schools that already employ collaboration among students (61), an understanding of fluid collaboration as an ensemble may broaden the collaborative forms available to children from all

backgrounds. An understanding of collaborative processes can be beneficial to children and society as children become adults and leaders in charge of solving complex interdependent social issues that require working together within their families, communities, and the world.

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Details of Methods and Results

Genders of sibling pairs

US Mexican Indigenous-heritage sibling pairs included 4 pairs of sisters, 5 pairs of brothers and 5 mixed pairs.

Middle-class European American sibling pairs included 6 pairs of sisters, 1 pair of brothers, and 9 mixed pairs.

Nepantla: US Mexican-heritage Hi-Schooling background sibling pairs were 2 pairs of sisters, 5 pairs of brothers, and 6 mixed pairs.

Scales for children's Collaborative Initiative *and* Adult Control

The children's *Collaborative Initiative* scale ranged from 0 to 8:
8) regularly volunteering complex household work (level 2 or 3) without adult control
7) initiative with no adult control, in extensive but simple household work (at least 3 level-1 tasks)
6,5) complex work (levels 2 or 3) done with a mix of initiative and adult control
4,3) extensive simple work (at least 3 Level-1 tasks), done with a mix of initiative and adult control
2) minimal work (only 1 or 2 tasks, at level 1), done with initiative
1) minimal work, done with some initiative but mainly with adult control
0) minimal work with no initiative, just adult control.

The *Adult Control scale* ranged from 0-2, for work done with

2) adult control and no collaborative initiative
1) a mix of child collaborative initiative and adult control
0) no adult control.

Results: Clusters of how children engaged in family work and in the shared planning task

The most common pattern among the US Mexican Indigenous-heritage siblings (7 of the 13 pairs) was to mainly collaborate with initiative at home and mainly collaborate as an ensemble (in more than 40% of the time segments) in the planning task. Of the remaining 6 pairs, only 1 pair mainly did chores under adult control and divided decisions in the planning task; 3 mainly used one of the other forms of collaboration in the planning task. The few remaining pairs were scattered in other combinations.

The most common pattern among the middle-class European American pairs (7 of 12 pairs who made any contribution at home) was mainly to do chores under adult control at home and often divide decisions in the planning task (in more than 30% of the time segments). No middle-class European American pairs mainly collaborated with initiative at home and often collaborated as an ensemble in the planning task. The remaining pairs were scattered in other combinations.

The sibling pairs with *Nepantla* backgrounds resembled the US Mexican Indigenous-heritage pairs, in a slightly weaker pattern: The most common pattern was to mainly collaborate with initiative at home and mainly collaborate as an ensemble in the planning task (5 of the 11 pairs who made a contribution at home). Of the remaining 6 pairs, only 1 pair mainly did chores under adult control and divided decisions in the planning task). The remaining pairs were scattered in other combinations.