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ABSTRACT

Chinese American children's academic performance in the United States has been noteworthy. This longitudinal study investigated sociocultural and family factors that contribute to children's academic achievement in the preschool and primary years. Samples of 40 European American (20 girls, 20 boys) and 40 second-generation Chinese American (20 girls, 20 boys) preschool and kindergarten children (mean age = 5.7 years) and their mothers, fathers, and teachers participated in 3 data collections (1993, 1995, and 1997). Chinese American children performed significantly higher in mathematics at all three times. European American children outscored the Chinese American children in receptive English vocabulary at Times 1 and 2, but the Chinese American children surpassed the European American children at Time 3. Chinese American parents structured their child's time to a greater degree and taught their children in more formal ways. Regressions showed that parents' work-oriented methods at Time 1 were the best predictor of children's mathematics performance at Time 3. These results challenge the predominant early childhood education philosophy in the United States, which recommends informal teaching methods for young children. (Contains 2 figures, 9 tables, and 22 references.) (Author)

Mathematics and Vocabulary Development in Chinese American and European American Children Over the Primary School Years

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Abstract

Chinese American children's academic performance in the United States has been noteworthy. This longitudinal study investigated sociocultural and family factors that contribute to children's academic achievement in the preschool and primary years. Samples of 40 European American (20 girls, 20 boys) and 40 second-generation Chinese American (20 girls, 20 boys) preschool and kindergarten children (mean age = 5.7 years) and their mothers, fathers, and teachers participated in three data collections (1993, 1995, and 1997). Chinese American children performed significantly higher in mathematics at all three times. European American children outscored the Chinese American children in receptive English vocabulary at Times 1 and 2, but the Chinese American children surpassed the European American children at Time 3. Chinese American parents structured their child's time to a greater degree and taught their children in more formal ways. Regressions showed that parents' work-oriented methods at Time 1 were the best predictor of children's mathematics performance at Time 3. These results challenge the predominant early childhood education philosophy in the United States which recommends informal teaching methods for young children.

Mathematics and Vocabulary Development in Chinese American and European American Children Over the Primary School Years

The much poorer mathematics performance of United States schoolchildren relative to that of European and East Asian nations has been noted for the last three decades (e.g., Geary, 1996; Stevenson, Chen, & Lee, 1993). In comparisons with East Asian students, the difference is evident as early as kindergarten and first grade (e.g., Geary, Bow-Thomas, Fan, & Siegler, 1993). Within the United States, Asian American children and adolescents outperform other American students in mathematics (e.g., Chen & Stevenson, 1995; Huntsinger, Jose, Liaw, & Ching, 1997).

Explanations for this phenomenon have included cultural differences in beliefs, educational systems, language, and parents' practices. The traditional Chinese view of teaching portrays teachers as repositories of knowledge and children as vessels to be filled (Gardner, 1989); whereas educators and parents in the U. S. have viewed the child as an active learner, constructing his/her own knowledge through discovery and exploration. Children in Confucian-heritage societies are taught perseverence, respect for elders, devotion to education, restraint of emotion, and concentration, all of which probably contribute to their academic success (Ho, 1994). Memorization and practice are viewed as important to the learning process (Liu, 1986). Mothers in the Chinese culture take their role as their child's teacher seriously, and children spend large amounts of time doing homework (Chen & Stevenson, 1995). Chinese parents believe that training children very early to work hard and to be disciplined is one way to foster self-motivation (Chao, 1994).

There is a predominant view among early childhood professionals in the United States that formal teaching of young children is inappropriate (e.g., Bredekamp, 1990) and that any initial academic gains from early teaching of academics will "wash out" over time (e.g., Durkin, 1987). This view is based on studies of formal group teaching in early childhood classrooms. The literature on the effects of systematic parental teaching (as opposed to classroom teaching) on children's academic performance is meager. The link between parental involvement and children's academic success has been well established. However, parents have been generally encouraged by education professionals to teach their children in an informal manner (Berger, 1995), rather than in a systematic, formal manner.

Eccles (1993) has demonstrated the importance of parent beliefs, attitudes, and practices on children's academic outcomes. Her theoretical model incorporates five areas of influence on children's outcomes: cultural, family and neighborhood characteristics, child characteristics, parents' general attitudes, parents' child-specific attitudes, and parents' practices. In this paper, we are focusing specifically on parents' practices.

The purposes of this longitudinal study are to investigate (1) how early the mathematics performance difference emerges; (2) how parental practices may account for the cultural difference in mathematics development, if it exists; (3) whether an initial difference (if obtained) will be maintained over the primary school years; and (4) as a comparison to the mathematics domain, how receptive English vocabulary develops in the two cultural groups.

Methods

Sample

In 1993 (Time 1) 40 second-generation Chinese American children (mean age = 5.67 yrs.) and 40 European American children (mean age = 5.60 yrs.) and their parents were recruited to participate in this longitudinal study. Each group comprised 10 preschool girls, 10 preschool boys, 10 kindergarten girls, and 10 kindergarten boys. All children came from comparably well-educated two-parent families. At Time 2 (1995) 95% of the original sample participated (36 Chinese American children and 40 European-American children). Three of the Chinese American children had moved back to Hong Kong or Taiwan. At Time 3 (1997) 91% of the original sample participated (35 Chinese American and 38 European American children). One additional Chinese American family had moved back to Hong Kong. (See Table 1 for sample characteristics.) Chinese was spoken in the homes by the immigrant parents of the Chinese American children.

Time 1 (1993) Children's Materials

The Test of Early Mathematics Ability-2. The TEMA-2 (Ginsburg & Baroody, 1990), designed for young children from 3 to 8 years of age, was used to assess both informal (35 items) and formal (30 items) mathematical thinking. Informal mathematics, acquired outside the context of formal schooling, is assessed by three kinds of items: concepts of relative magnitude, counting, and calculation. Formal mathematics, learned through explicit instruction using rules, principles, and procedures, is assessed by four kinds of items: knowledge of convention, number facts, calculation (addition and subtraction), and base-ten concepts.

Peabody Picture Vocabulary Test-Revised. The PPVT-R Form M (Dunn & Dunn, 1981), designed to be used with toddlers through adults, was used to measure receptive English vocabulary. Children are presented with plates containing 4 separate pictures from which they are asked to choose the picture which represents the target word pronounced by the examiner. This test is very appropriate for young children whose home language is not English.

Time 2 (1995) Children's Materials

The Sequential Assessment of Mathematics Inventories. The SAMI (Reisman & Hutchinson, 1985) measures the performance of children from kindergarten through eighth grade in eight strands of mathematics. Seven of the eight subtests were administered: mathematical language (9 items), ordinality (9 items), number and notation (62 items), computation (77 items), measurement (29 items), geometric concepts (21 items), and word problems (18 items). The mathematical applications subtest, designed for students in fourth through eighth grades, was not given. Individual administration takes from 20 to 60 minutes per child. Standard scores are used in the between group comparisons.

Peabody Picture Vocabulary Test-Revised. The PPVT-R Form M (Dunn & Dunn, 1981) was again administered at Time 2 when the children were in first and second grades.

Time 3 (1997) Children's Materials

The Sequential Assessment of Mathematics Inventories. The same seven subtests of the SAMI (Reisman & Hutchinson, 1985) were administered to the children in their schools when they were in third and fourth grades. The mathematical applications subtest was not given because it would have been appropriate for only the fourth grade children.

The Peabody Picture Vocabulary Test-III. The PPVT-III (Dunn & Dunn, 1997) was used to assess the children's receptive vocabulary. All tests were administered individually in the late spring of each year. Standard scores are used for between-group comparisons.

Times 1, 2, and 3 Parent Materials

Parent Questionnaires. At all three times fathers and mothers individually completed questionnaires surveying demographics, attitudes toward academic subjects and extracurricular activities, their child's preschool experiences, and their expectations for their child. Questionnaires were translated into Chinese for parents who were more comfortable completing them in Chinese. The questions used in this paper from both the Time 2 and Time 3 parent questionnaires are as follows: 1) How much daily homework does your child's teacher assign in each specific area (reading, spelling, mathematics, writing, social studies, science)? [none, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 or more minutes]; 2) Do you and your spouse give him/her any additional homework? If yes, indicate the total amount of parent-assigned homework per day in each area [none, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 or more minutes].

Parent Interviews. At all three times mothers and fathers were interviewed together in their homes regarding their facilitation of their child's reading and mathematics development and the time allocation in their child's typical weekday. About one fourth of the Chinese American parents chose to be interviewed in Chinese at Time 1. Four couples asked to be interviewed in Chinese at Time 3. Three questions from the parent interviews at each Time 1, Time 2, and Time 3 are used in this paper: 1) How do you facilitate your child's development in reading?
2) How do you facilitate your child's development in mathematics? 3) Please describe your child's typical weekday in the spring from the time s/he gets up in the morning until the time s/he goes to bed at night.

Teachers' questionnaire. Each child's teacher completed a questionnaire at Times 1, 2, and 3. The following question, taken from the Time 3 questionnaire, is used in this paper: How well does this child do in the following subject areas (reading, science, mathematics, spelling, writing, social studies, art, gym)? [1=not so well; 2= somewhat well; 3= moderately well; 4= very well].

Variable Explanations

Mathematics teaching methods. After each data collection (Times 1, 2, & 3) a master list was compiled of all the ways parents said they facilitated mathematics. The first author and a college early childhood education instructor independently rated each method from the master list on a scale of 1 (informal) to 3 (formal). A rating of 1 represented informal, indirect, spontaneous, play-oriented methods (e.g., "She helps measure the ingredients when we cook."); a rating of 2 represented more structured game-like methods (e.g., We've bought computer games—like Millie's Math House); and a rating of 3 represented formal, direct, regular, work-oriented methods (e.g., "I assign her 3-4 pages in a first grade math workbook every other day." (The child was in kindergarten.)) A mean informality-formality index was created for each family by coding each method they had named with 1, 2, or 3 and finding the arithmetic average of the sum. The resulting variable was called mathematics teaching methods.

Reading teaching methods. A similar procedure was followed for the reading teaching methods variable at all three time points. A master list was compiled of all the ways parents said they facilitated reading. The first author and a college early childhood education instructor independently rated each method from the master list on a scale of 1 (informal) to 3 (formal). A rating of 1 represented informal, indirect, spontaneous, play-oriented methods (e.g., "She pretend reads picture books to us."); a rating of 2 represented more structured game-like methods (e.g., "She plays an alphabet game on the computer,"); and a rating of 3 represented formal, direct, regular, work-oriented methods (e.g., "I have him practice writing upper and lower case letters 20 minutes a day"). A mean informality-formality index was created for each family by coding each method they had named with 1, 2, or 3 and finding the arithmetic average of the sum. The resulting variable was called reading teaching methods.

Homework time. When the parents were asked to describe in detail their child's weekday schedule, a time diary was created. Time diaries have been used by recent researchers to assess time allocation in people of all ages (e.g., Huston, Wright, Murphy, & Oppenheimer, 1993; Timmer, Eccles, & O'Brien, 1985). At Time 1 the homework time variable, taken from the time diary, represented the amount of time parents reported the child spent in focused practice on a task (mathematics, music, and drawing). Children at Time 1 were in preschool and kindergarten where teachers do not generally assign homework. At Time 2 and Time 3 the mathematics homework time variable, taken from the parent questionnaire, was the sum of the amounts of time spent on teacher-assigned mathematics homework and parent-assigned mathematics homework.

For the regressions, the Time 1 mathematics teaching methods variable and the Time 1 homework time variable ($r = .52$) were standardized and combined into a single variable called Time 1 work-oriented methods. In the same manner, the Time 2 variables ($r = .46$) and the Time 3 variables ($r = .30$) were standardized and combined into the variables called Time 2 work-oriented methods and Time 3 work-oriented methods.

Results

Analysis of Variance and Chi-Square Results

Analyses of variance (ethnic group x gender of child) were used to examine between-group differences. No gender of child differences were found on the following variables. Standard scores are used for between-group comparisons.

Time 1. When the children were in preschool and kindergarten (1993), Chinese American children ($M = 122.94$) outscored European American children ($M = 109.5$) in mathematics (TEMA-2), $F (1, 76) = 16.56$, $p < .0001$. (See Figure 1.) Chinese American children performed better in both informal and formal mathematics than did their European American counterparts. On the other hand, European American children ($M = 118.3$) outscored Chinese American children ($M = 99.22$) on receptive English vocabulary (PPVT), $F (1, 76) = 52.00$, $p < .0001$. (See Figure 2.)

Chinese American children spent much more time on focused practice on a task than European American children. Chinese American parents were found to have taught mathematics to their children in more formal, systematic ways; whereas, European American parents relied on informal teaching embedded in context. Regression analyses showed that the parents' more formal methods (regardless of ethnicity) predicted children's higher mathematics scores.

Time 2. When the children were in first and second grades (1995), Chinese American children (M = 128.75) outperformed the European American children in mathematics (SAMI) (M = 118.9), F (1,72) = 17.66, $p < .0001$. Chinese American children scored higher in the computation (Ms = 15.06, 11.85) and word problems (Ms = 16.00, 15.10) subtests, Fs (1, 74) = 33.90, 3.33; ps < .0001, .08. European American children (M = 117.30) continued to outscore Chinese American children (M = 108.94) on receptive English vocabulary, F (1, 72) = 11.87, $p < .001$, but the gap had narrowed.

Chinese American parents continued to use more systematic, formal methods for facilitating mathematics learning and their children continued to spend more time on homework. Regression analyses revealed that Time 1 and Time 2 parental math teaching methods had independently predicted Time 2 mathematics scores. (See Huntsinger, Jose, & Larson (1998) for a complete discussion.)

Time 3. When the children were in third and fourth grades (1997), Chinese American children (M = 128.71) had maintained their advantage in mathematics over European American children (M = 119.47), F (1, 69) = 18.75, $p < .0001$. They achieved higher standard scores in subtests of computation (M = 15.22), geometry (M = 15.23), notation (M = 15.94), and word problems (M = 16.46), than did European American children (Ms = 13.05, 13.79, 13.92, 15.29), Fs (1, 69) = 18.45, 4.73, 23.11, 9.75, ps < .0001, .05, .0001, .01, respectively. This time Chinese American children (M = 118.49) also outscored the European American children (M = 110.92) in receptive English vocabulary (PPVT-III), F (1, 69) = 3.34, $p = .07$.

Significant cultural differences were found in children's time use. (See Table 2.) Chinese American children were awake longer each day and spent more time on music practice, Chinese homework, weekend Chinese school, and music lessons. European American children spent more time in sports practice, religious education, and sports competitions.

Chinese American parents continued to use more formal methods to facilitate mathematics development than did European American parents (See Tables 3 & 4). Chinese American children again spent more time on mathematics homework, but the magnitude of the difference had decreased from Time 2, possibly because the amount of teacher-assigned homework had increased.

The reading methods reported by parents are not completely analyzed at this point. Several between-group differences are evident, however. (See Table 5.) European American parents were more likely to read to their children and to mention giving their child time to read. European American children were more likely to read to their parents regularly. Chinese-American children were more likely to visit the library regularly.

Teachers rated the Chinese American children as doing better than European American children in reading (Ms = 3.78, 3.49), mathematics (Ms = 3.78, 3.43), spelling (Ms = 3.91, 3.49), writing (Ms = 3.77, 3.21), and social studies (Ms = 3.84, 3.48), Fs (2, 69) = 4. 50 to 8.82, ps < .01 to .05. European American children were rated as more skilled in gym (Ms = 3.61, 3.29), F (2, 69) = 3.93, p = .052.

Correlational Results

Mathematics scores at Times 1, 2, and 3 were highly correlated for children in both ethnic groups. (See Table 6.) Children who performed well at Time 1 tended to perform well at Times 2 and 3.

Intercorrelations among Times 1, 2, and 3 receptive vocabulary scores were lower than those for mathematics. (See Table 7.) It may be because vocabulary is acquired in a more informal, idiosyncratic way, whereas mathematics is formally taught in a sequential way. Some interesting correlations emerged between PPVT scores and time spent on sports practice/games. For both groups of children, greater involvement in sports was linked to lower likelihood of reading in their free time (rs = -.38 and -.28, ps < .05). For the European American children greater involvement in sports was linked to lower PPVT scores (r = -.35, p < .05) and lower likelihood of visiting the library regularly ($r = -.30$, $p < .05$). European American children who liked to read in their free time had higher PPVT scores ($r = .48$, $p < .01$).

Regression Results

To determine the relative influences of parents' Time 1 teaching, Time 2 teaching, and Time 3 teaching on children's Time 3 mathematics achievement, a series of multiple regressions was performed. In our full model, we regressed ethnicity, Time 1 work-oriented methods, Time 2 work-oriented methods, and Time 3 work-oriented methods in a block followed by the three interaction terms (Ethnicity x Time 1 methods, Ethnicity x Time 2 methods, and Ethnicity x Time 3 methods) as a block on the dependent variable of Time 3 SAMI raw score. (See Table 8.) The first block of variables in the full model accounted for 35% of the variance in children's Time 3 math scores. The second block of variables (the three interaction terms) accounted for 10% of the variance. In the final regression equation, only parents' Time 1 work-oriented methods emerged as a significant predictor of their children's Time 3 mathematics scores. (See Table 8.)

Were the interaction terms necessary to adequately describe the relationship? It is important to note that keeping the interaction terms which are actually not influential is preferable to dropping influential interactions from the point of view of validity of subsequent test results. In order to determine whether the interaction terms were necessary, we compared the results of the full model with the results of the reduced model which did not contain the interaction terms. In our reduced model, only the variables in the first block were regressed on the dependent variable of Time 3 mathematics score. An F-test comparing the full model to the reduced model (without the interaction terms) revealed that the interaction terms also made a significant contribution, $F(3, 61) = 3.69$, $p < .025$. Beta weights indicate that the interaction of Ethnicity x Time 1 work-oriented methods contributed more than the Ethnicity x Time 2 methods and Ethnicity x Time 3 methods interaction terms.

Do Time 2 and Time 3 variables add significantly to the regression equation? An F-Test comparing the full model to a second reduced model containing only Ethnicity, Time 1 work-oriented methods, and the interaction term (Ethnicity x Time 1 methods) revealed that the contribution of Time 2 and Time 3 was not significant to the equation, $F(3, 69) = .79$. In the final model, Ethnicity, parents' Time 1 work-oriented methods, and Ethnicity x Time 1 work-oriented methods contributed 41% of the variance in Time 3 mathematics scores. (See Table 9.) We can conclude that parents' work-oriented methods at the preschool/kindergarten level are an important influence on children's later mathematics performance. The Ethnicity x Time 1 mathematics methods interaction is interpreted to mean that European American children's Time 3 mathematics scores would be influenced to a greater degree by more systematic parental teaching at Time 1 than would Chinese American children's scores. Most Chinese American parents were already doing systematic teaching of their child, whereas few European American parents were doing formal teaching.

Discussion

The superior mathematics achievement of second-generation Chinese American children begins very early and is maintained over the primary school years. In addition, Chinese American children, whose primary home language is Chinese, surpassed European American children in receptive English vocabulary by fourth grade. Chinese American parents taught their children in more formal ways and expected their children to do much more homework than did most European-American parents. Parents' work-oriented methods predicted their children's mathematics scores at Times 1, 2, and 3, regardless of ethnicity. In addition, Time 1 parents' work-oriented methods were the best predictor of Time 3 mathematics scores. It appears that the parental practice of early training and discipline was very influential in children's later mathematics performance. This result challenges conventional wisdom that says the effects of early formal teaching wash out over the primary school years. It also causes us to question the recommendation given to parents nowdays to teach their children in informal ways, rather than formal ways. Parental teaching of mathematics when children were in preschool and kindergarten appears to play a major role in the children's mathematics performance at the third and fourth grade levels.

Why did the Chinese American children surpass the European American children in vocabulary? Although the reading teaching methods have not been fully analyzed, we do have some clues. Chinese American parents at Time 3 revealed explicit goals for their children's vocabulary development. In answer to the reading facilitation question, several parents spontaneously mentioned they wanted their child to learn a specific quantity of new vocabulary words per week. Another parent said that she asked her daughter to underline any unfamiliar vocabulary when she was reading a book. Other parents expected their children to look up any new words in a dictionary. One parent 's summer assignment for his daughter was to find 15 new words from each chapter and write them in sentences. None of the European American parents mentioned vocabulary-building in response to the reading facilitation question. There is doubtless greater motivation on the part of the Chinese American children (and their parents) to learn English vocabulary to maximize their chances of success in their new country (Sue & Okazaki, 1990). Another contributing factor might be the greater sports involvement on the part of European American children and their parents. Greater sports involvement was associated with lower PPVT scores, lower likelihood of reading in their free time, and fewer trips to the library.

We acknowledge that our sample size is small and that this study needs replication. Our sample came from two-parent, middle class families. Caution should be exercised when generalizing these results to other populations.

This study adds to our currently limited knowledge of the cultural contexts of education. Most studies that have been conducted to investigate the Asian American superiority in mathematics performance have used high school subjects. This study demonstrates that the difference begins very early and is maintained through the primary grades. It gives some insight into parental practices which contribute to the difference. Ironically, the practices of the Chinese American parents were rated as developmentally inappropriate (Bredekamp, 1990) and the practices of the European American parents were rated as developmentally appropriate by a group of well-educated early childhood professionals (Huntsinger et al.,1998). We may need to rethink our notions of what is appropriate.

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Table 1

Sample Demographics at Time 3

	Chinese American			European American		
	N	Mean	S.D.	N	Mean	S.D.
Age of child		9.75	.34		9.70	.32
Boys in sample	17			18		
Girls in sample	18			20		
Number of children in family		2.21	.55		2.41	.71
Mother's age		41.38	2.88		40.88	4.40
Father's age		43.77	3.09		43.62	4.84
Mother's educational attainment		16.73	1.94		17.18	1.32
Father's educational attainment		18.23	2.21		17.68	1.81
Hollingshead (1975) status score		59.83	6.81		60.77	4.63

Note. There are no significant differences on any of the sample characteristics.

Table 2

Cultural Differences in Time Use at Time 3

	Chinese American	European American	F
Hours per day awake	14.51	14.14	5.53*
Free hours per day	1.34	1.60	N.S.
Time on homework (min./day)	70.14	54.61	N.S.
Musical instrument practice (min./day)	32.34	5.16	18.66****
Time on sports practice (hrs./week)	.55	2.47	18.09****
Reading time (min./day)	30.60	22.45	N.S.
Time on Chinese homework (hrs./wk)	1.74	0.00	57.15****
Weekday TV time (hrs./day)	.68	.60	N.S.
Before or after school day care (hrs./week)	2.89	1.15	N.S.
Religious education (hrs./week)	.96	1.90	10.40**
Weekend Chinese school (hrs./week)	2.19	0.00	151.87****
Sports competitions (hrs./week)	.24	1.25	11.53***
Music lessons (min./week)	59.86	7.97	33.61****
Art classes (hrs./week)	.27	.04	N.S.

Notes. Amounts of time were taken from the time diary provided by the parents.

**p <.01. ***p < .001. ****p < .0001.

Table 3

Cultural Differences in Mathematics Teaching Methods and Homework Time

	Chinese American	European American	F
Time 1 parent math teaching methods†	2.19	1.67	15.07****
Time 2 parent math teaching methods†	2.37	1.74	27.73****
Time 3 parent math teaching methods†	2.43	1.96	27.67****
Time 1 focused practice time (min./day)	54.2	5.8	43.53****
Time 2 mathematics homework time (min./day)	21.1	4.7	30.40****
Time 3 mathematics homework time (min./day)	19.6	13.2	8.31**

Notes. †The formality rating of the math teaching methods on a 3-point scale, where 1 = informal and 3 = formal.

**$p < .01$. ****$p < .0001$.

Table 4

Cultural Differences in Parents' Facilitation of Children's Mathematics Development

Parents' Method	Chinese-American	Euro-American	X^2
Real-life situations, i.e., counting out toll money (1)†	3	17	11.97***
Computer software (2)	4	11	3.43*
Assigns child more problems to practice on (2)	18	9	6.02*
Emphasis on memorization of math facts (2)	5	2	N.S.
Checks child's homework (2)	14	7	4.14*
Helps with homework (2)	12	13	N.S.
Gives math challenges while driving in car (2)	0	7	7.13**
Makes/buys additional math teaching materials (3)	16	12	N.S.
Extends school homework one step further (3)	8	1	6.90**
Systematic preteaching of higher level material (3)	9	6	N.S.

Notes. Parents' methods are taken from answers to the open-ended interview question, "How do you facilitate your child's development in mathematics?" Categories mentioned by 7 or more parents are included.

†Number in parenthesis indicates the formality rating on a 3-point scale, where 1 = informal and 3 = formal.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 5

Cultural Differences in Parents' Facilitation of Children's Reading Development

Parents' Method	Chinese American	European American	X^2
Visit the library occasionally	16	11	N.S.
Visit the library regularly	17	10	3.87*
Buy books, magazines, newspapers andbook/tape sets	11	15	N.S.
Family goes to bookstore to browse.	3	5	N.S.
Parents read to child.	2	16	12.99***
Parents give the child time to read.	6	17	6.43*
School requires child to read/parents sign sheet.	7	5	N.S.
Parent or sibling is good reading model	1	8	5.58*
Parent asks comprehension questions.	4	3	N.S.
Bought computer reading software.	4	4	N.S.
Child chooses own books.	10	3	
Parent influences child's book selection.	7	3	N.S.
Child reads to parent regularly.	0	11	11.93***
Devised a reward system	3	4	N.S.

Notes. Parents' methods are taken from answers to the open-ended interview question, "How do you facilitate your child's development in reading?" Categories mentioned by 7 or more parents are included.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 6

Intercorrelations of Mathematics Scores from Time1, Time 2, and Time 3

	Time 2 Score	Time 3 Score
Time 1 TEMA-2 Score	.75***	.76***
	.74* **	**.74*** **
Time 2 SAMI Score		.68***
		.87* **

Notes. Chinese American correlations are in regular type. European American correlations are in bold type.

***$p < .001$.

Table 7

Intercorrelations of Receptive Vocabulary Scores from Time1, Time 2, and Time 3

	Time 2 Score	Time 3 Score
Time 1 PPVT-R Score	.27	.46**
	.63* **	**.30***
Time 2 PPVT-R Score		.42**
		.57**

Notes. Chinese American correlations are in regular type. European American correlations are in bold type.

*p < .05. **p < .01. ***p < .001.

Table 8

Prediction of Children's Mathematics Scores from Time 1, Time 2, and Time 3 Mathematics Work-Oriented Methods

Child Outcome		Predictors	R^2 Change	Total R^2	β	p
Mathematics Score Time 3	Step 1	Ethnicity	.35****	.35	.10	.495
		Time 1 mathematics methods			.51	.002
		Time 2 mathematics methods			-.11	.533
		Time 3 mathematics methods			-.16	.398
	Step 2	Ethnicity x Time 1 methods	.10*	.45	.27	.105
		Ethnicity x Time 2 methods			.14	.373
		Ethnicity x Time 3 methods			.24	.141

Notes. Chinese American was coded as 0 and European American was coded as 1. Betas and p values are from the final regression equation; R^2 change and R^2s are from the step at which the particular variable entered the equation, N = 73.

*p < .05. ****p < .0001.

Table 9

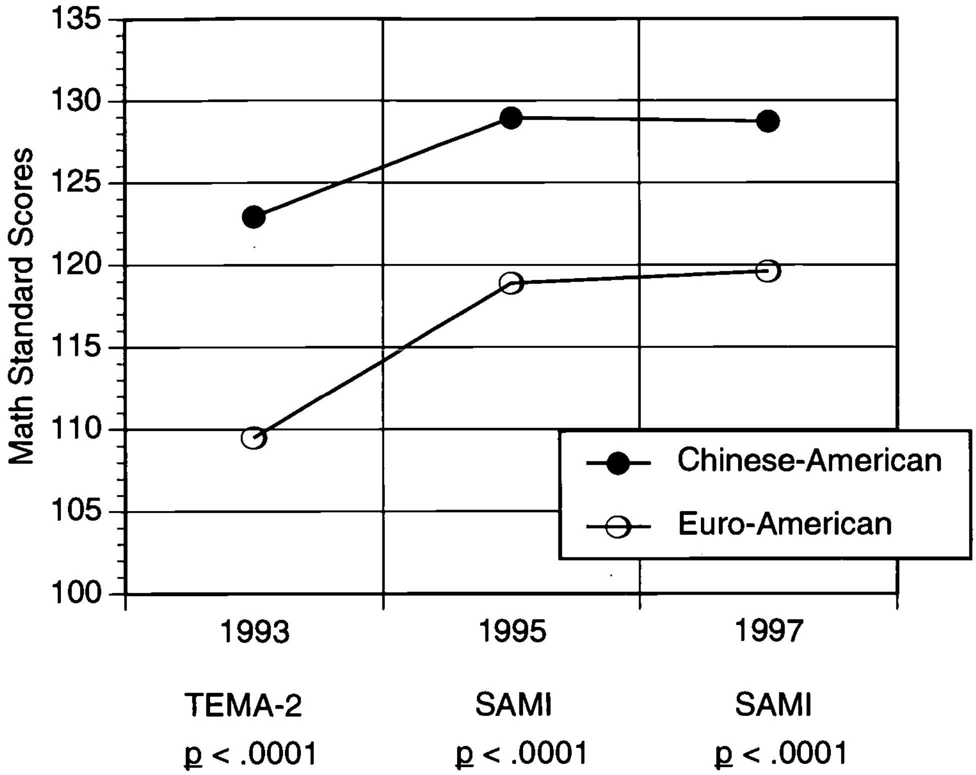
Prediction of Children's Mathematics Scores from Time 1 Mathematics Work-Oriented Methods

Child Outcome		Predictors	R^2 Change	Total R^2	β	p
Mathematics Score Time 3	Step 1	Ethnicity	.34****	.34	.09	.520
		Time 1 mathematics methods			.36	.005
	Step 2	Ethnicity x Time 1 methods	.07**	.41	.42	.005

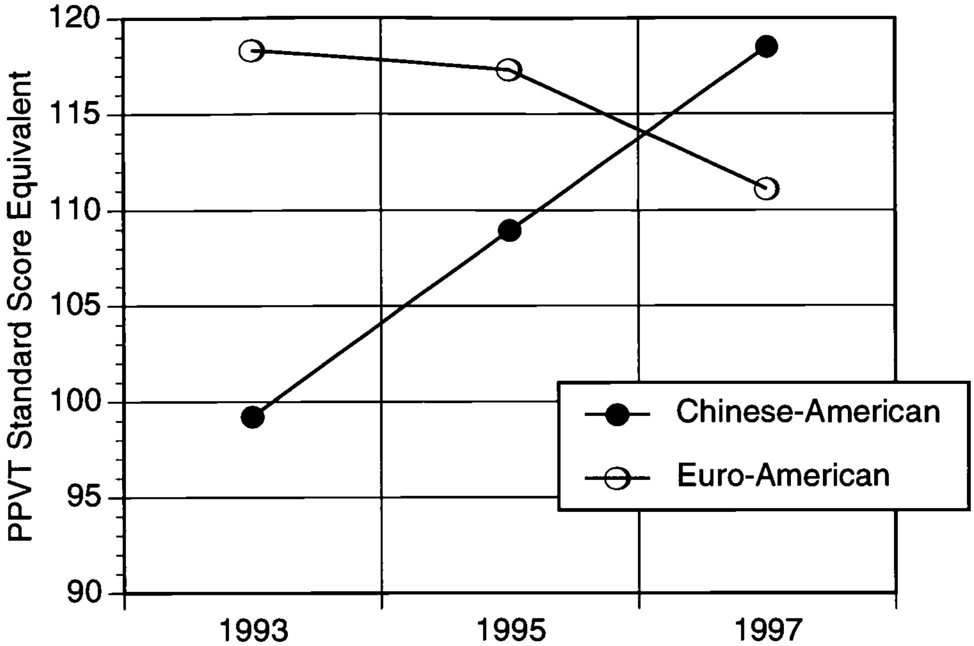
Notes. Chinese American was coded as 0 and European American was coded as 1. Betas and p values are from the final regression equation; R^2 change and R^2s are from the step at which the particular variable entered the equation, N = 73.

*p < .05. ****p < .0001.

Cultural Differences in Mathematics Scores Over Time



Cultural Differences in Receptive English Vocabulary Over Time



$\underline{p} < .0001$ $\underline{p} < .001$ $\underline{p} < .08$

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