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Japanese Children's Planning Skills:

Differential Influence of American and Japanese Peer Collaboration

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日本人の子どもの計画スキル

―日本人またはアメリカ人の子どもをパートナーとする協同が日本人の子どもに及ぼす影響―

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Abstract

To examine cultural variations in collaboration on an errand-planning task, seven-year-old Japanese children were paired with either American or Japanese children of the same age or older (age nine), and completed the planning task as a dyad and later independently. Task performance and various measures of collaboration were analyzed. Results showed that young Japanese children benefited most from the collaboration with older Japanese children. American partners showed more verbal exploration, but it was only the verbal exploration by Japanese partners that predicted posttest performance by younger Japanese children. These data suggest that the transfer of skill from older to younger peers in collaborative tasks may depend, in part, on culturally shared styles of giving and receiving guidance.

Keywords : peer collaboration, Japanese children, American children, planning skills, cultural variation

Introduction

In this study we examined Japanese children's collaboration with American children in a planning task where they were given opportunities to model cognitive performance. Children develop necessary, valued, and culturally specific skills through interaction with others. When children are born in one culture and are then exposed to another later in life their interactions with others in the new culture will be different, with possible consequences for cognitive development.

The concept of social affordances (Loveland, 1991; Valenti and Good, 1991; Good, 2007) provides a useful framework for understanding the nature of interactions between Japanese and American children. In short, children's interactional patterns are viewed with reference to the social ecology— the fit between behavior and opportunities for behavior provided by others. In an ecological framework, social affordances are the opportunities for interaction which are afforded by others. Japanese children are born into varieties of social affordances which are shared by Japanese people and embedded in Japanese culture. This is true even for Japanese children who are born in America because their Japanese parents' expectations and socialization practices are based on Japanese culture. When these children first encounter teachers and other students in school--a completely American social context--they experience a different set of social affordances. Acculturation requires that children somehow cope with novel social affordances— in a sense, the unspoken rules of social interaction— but this process has not received much attention in the developmental or cross-cultural research literatures.

Two leading developmental psychologists, Piaget and Vygotsky, both emphasized the importance of sharing of practices, perspectives, and meaning in social interaction. However, they had differences as well. Piaget's model of mental embryology is built upon the individual's discovery of the logical structure of his own actions, and the continual elaboration of

these logical structures in a self-organizing, equilibrated process (Piaget, 1967). Vygotsky's theory, on the other hand, locates the germ of higher psychological functions in social interaction, not individual action: "human learning (and higher functions) presupposes a specific social nature and a process by which children grow into the intellectual life of those around them." (Vygotsky, 1935/1978). In Piaget's perspective, individuals work independently to solve problems based on their equality, influencing each other's ideas, whereas in Vygotsky's perspective, cooperative problem solving initially occurs between unequal partners as a unit.

Rogoff (1990) stated that Vygotsky's approach is better equipped to conceptualize thinking-in-context because developmental studies have documented the origins of cognition in social interaction in infancy. Autonomous cognitive activity, in this view, follows the internalization of higher psychological functions used by competent social partners. These functions include symbolism, memory and problem-solving strategies. Vygotsky focused primarily on the beneficial effects of child-adult interaction on children's cognitive development, where social interaction creates the “embryos” of new cognitive skills within the child. Extending these ideas, Rogoff and colleagues have examined peer interactions as a context for guided participation in complex activities and the transfer of cognitve skills.

For example, Radziszewska and Rogoff (1988) examined the effects of adult guidance on the development of 9-year-old children's errand planning skills using a map of an imaginary town. Children's performance while working with a parent was compared to that of children collaborating with peers. When adult partners stated and modeled effective strategies and shifted decision making from the self to the child in the collaborative trials, their children typically showed successful performance working alone on the posttest. Overall, collaboration with an adult lead to better independent child performance.

Gauvain and Rogoff (1989) found in a similar experimental setting that 9-year-old children, alone or with partners, tend to use more advanced planning than did younger, five-year-old children. When younger children collaborated with these older and more skilled peers, the younger children used more effective plans when working alone during a posttest. Collaboration, furthermore, occurred less frequently among younger dyads. However, when they shared responsibility, the planning of younger dyads appeared to be more effective. When mothers were partners with their five-year-old children in another condition, the collaboration did not produce any effects on children's later independent performance. However, when only those dyads that shared responsibility in problem solving were selected for analysis, children's performance was shown to improve on later independent planning tasks, and this was true when either mothers or peers were the collaborative partners.

In another study, Radziszewska and Rogoff (1991) compared 9-year-old children's collaboration with either untrained peers, trained peer partners or adult partners in an errand planning task. They found that among untrained peer dyads, neither child demonstrated sophisticated planning strategies. Among dyads with one trained peer, only the trained peers demonstrated advanced planning skills. However, they did not communicate these skills to their partner, nor were the target children involved in advanced planning. The target children benefited primarily from collaboration

with adults, as shown by independent posttest scores for route planning, because they participated in planning and received guidance.

These three studies (Radziszewska and Rogoff, 1988, 1991; Gauvain and Rogoff, 1989) indicate that young children tend to learn more from interactions when they are actively involved in collaboration. This consequence seems to occur when the collaboration partners of younger children have good problem solving skills, provide guidance, and share the responsibility in decision making.

However, collaboration can take on many forms, and it is possible that common modes of collaboration in the United States may not fit the experiences and expectations of young children from Japanese culture. In other words, the social affordances for collaboration may vary across cultures. We think these variations in collaborative style may lead to difficulties for some young Japanese children in America.

Socialization in Japan places emphasis on interactions with adults, where an iiko (good child) is expected to be sunao (obedient), otonashii (mild and gentle), and jiseishin ga aru (self-controlled) (Hess et al., 1986), but also gambaru (to persist) and gaman suru (endure hardship) (White & Levine, 1986). In America, however, the middle-class "good child" is more often assertive, socially competent with peers, as well as courteous. Verbal modes of communication may be more emphasized in America than in Japan whereas behavioral responses appear to be more essential in Japanese culture (Caudill, 1971; Caudill and Weinstein, 1974; Hess et al., 1986). Minami's (1993, 1994) data are suggestive: Five-year-old Japanese speaking children, whether living in Japan or in the United States, produced significantly less utterances than five-year-old, English speaking Canadian children . Differences between Japanese and American children in behavioral characteristics are also reported in family dynamics (e.g., Vogel & Vogel, 1961; Doi, 1973; Lebra, 1976), academic achievement (Stevenson, Stigler, Lee, Kitamura, Kimura, and Kato, 1986), modality in information processing (Rolandelli, Sugihara, and Wright, 1992), and classroom interaction (Tomizawa,1988).

Presently we know little about how children with different cultural backgrounds interact. We think that an analysis of collaboration may reveal the social affordances relevant to skill development in school-type tasks and to acculturation in general. In order to address these issues, we paired Japanese children with either an American or a Japanese child of the same age or older and encouraged them to do a collaborative task similar to the experimental setting used by setting Radziszewska and Rogoff (1988, 1991). It was assumed that the older partners in the present study shared the level of competence demonstrated by the trained peers in Radziszewska and Rogoff's study (1991) because older age is frequently associated with better planning and related cognitive skills (e.g., Kreitler & Kreitler, 1987; Oppenheimer, 1987; Pea & Hawkins, 1987; Gauvain, 1996).

In the present study, it was predicted that the same partner ethnicity would be related to higher plan efficiency score due to shared social affordances. Also, we anticipated that older partners would show better performance on the errand task due to their better planning skills. In addition, we predicted that higher frequencies of joint decision making, verbal- and nonverbal exploration, strategic thinking aloud, tutorial quality, and verbal- and nonverbal active following would be associated with higher plan efficiency score, consistent with the findings of Radziszewska and Rogoff

(1991).

Method

Design

This study was organized as a 2 (partner age) X 2 (partner ethnic group) X 4 (phase of study) mixed design, with phase of study as a within-subjects variable. Forty seven-year-old Japanese children (referred to as targets) worked with one of 4 types of partners: seven-year-old Japanese, seven-year-old American, nine-year-old Japanese, and nine-year-old American. In the first and fourth phase of the study, the Japanese target children worked alone on a map-planning task. In the middle two phases (2 and 3), each Japanese target child collaborated with his or her assigned partner on the task. A task-performance measure was collected on all phases of the study, as well as measures of collaboration quality during Phases 2 and 3. Of primary interest was (a) the extent of skill transfer from partner to target child within a phase and across phases, and (b) an assessment of the collaborative qualities most strongly associated with level of performance across partner conditions.

Participants

Eighty children, equally divided among boys and girls within all conditions and arranged in same-sex pairs, participated in this study. Forty seven-year-old Japanese children served as targets (*M* 7 years 6 months). Four groups of 10 children each served as partners: 10 seven-year-old Japanese children (*M* 7 years 6 months), 10 nine-year-old Japanese children (*M* 9 years 6 months), 10 seven-year-old Caucasian-American children (*M* 7 years 6 months), and 10 nine-year-old Caucasian-American children (*M* 9 years 7 months). Some of the Japanese children were born in Japan and had lived in the United States for at least two years with native Japanese parents. All other Japanese children were born in the United States and had lived with native Japanese parents. All Japanese children were familiar with both Japanese and American peer-interaction norms, and could communicate with peers in either Japanese or English. Japanese participants were recruited primarily from Japanese weekend schools in the greater New York City area. Caucasian-American children were recruited from area public schools.

Materials

Four imaginary errand planning tasks, similar to those used by Radziszewska and Rogoff (1988, 1991) were created for use on individual (target child alone) and collaborative (target and partner children) trials. A street-map of an imaginary town, showing 13 stores and a school, was presented to the child along with a shopping list. Each item on the list and each store on the map were labeled in both English and Japanese, and were accompanied by illustrations to assure that children as young as seven would identify them easily. For all trials, the shopping lists contained six items, four of which could be found in only one store (no choice items) and the other two could be found in two different stores (choice items). Target children were given blue markers, and partner children were given black markers, to be used to draw an optimal (shortest) route on the map for purchasing all of the items on the shopping list. They were also given red and blue pencils to mark stores on the map or lists in any way they chose.

Procedure

The experimenter was Japanese and spoke in Japanese to give instructions when both children were Japanese; the experimenter gave the instructions first in English, and then in Japanese, when the target child was Japanese and his or her partner was American. Each

dyad was seated at a table and provided with a map of an imaginary town, a shopping list, blue and black marker pens, and blue and red color pencils. All four phases of the study were videotaped in order to permit later coding of task performance and collaborative behaviors.

The children were asked to pretend that they were going shopping for items for a class party. In order to find the shortest route, children were supposed to look ahead and plan before actually drawing. They were told to start at the school, buy all six items on their shopping list, and come back to school in the shortest possible route (in order to save gasoline). They first were familiarized with the stores on the map and the items of the shopping list by showing and pointing to some of them. They were also told that four of the items on their shopping list were available in one store only (no-choice items) and the remaining two could be bought in either of two stores (choice items). They were told they could mark-up the shopping list and the map with the pencils in any way they wanted, and they should draw the shortest route on the map with a marker pen. In order to further familiarize them to the task, one short practice trial was conducted.

Each member of the pair first planned a shopping route alone (Phase 1). They then collaborated on two additional shopping trips (Phases 2 and 3). Finally, each child working alone and planned a final shopping trip (Phase 4). On each of the shopping errands, a different list of 6 items was used, thereby requiring similar skills of planning rather than rote memory from earlier errands. Both children's behavior, on individual as well as on collaborative trials, was recorded on videotape by two cameras positioned above the children and the imaginary map.

Coding of dyadic interaction

One trained coder, a Japanese woman who had excellent English language skills, recorded the chronological sequence of decisions, frequencies of 12 collaborative variables, average planning unit (derived from other collaborative codes), and plan efficiency for each imaginary errand, to total 14 measures. Many of these measures were derived from past research by Radziszewska and Rogoff (1988,1991). We employed an event coding procedure, where movement to the location of six items on the shopping list was coded for the presence or absence of each of the focal collaborative behaviors. Thus, each of the 12 collaborative variables ranged from 0 to 6.

Each collaborative variable was defined as follows.

1. <u>One-step moves.</u> This variable indicates a relatively low-level of planning, where destinations are chosen item by item and children draw a line from one destination to another.

2. <u>Joint decision making.</u> Joint decision making occurs when both the target and the partner contribute to the decision on how to move to the next store or set of stores.

3. <u>Verbal exploration.</u> This variable indicates advanced planning skill and involves any verbally communicated preparation or search aimed at obtaining information for general purposes rather than for any one immediate destination or item.

4. <u>Nonverbal exploration.</u> Similar to verbal exploration, this variable also indicates advanced planning skill and involves any preparation or search nonverbally expressed and aimed at obtaining information for general purposes rather than for any one immediate destination or item.

5. <u>Optimal strategy.</u> This variable is coded when statements are made about the optimal strategy, namely,

to find no-choice stores first and then to choose the choice-stores which will yield the shortest route, before beginning to draw the route.

6. Strategic thinking aloud. This variable codes comments about what the self is doing or has done to accomplish the task and why. These statements are made either to oneself or to the partner.

7. Tutorial quality. This variable codes any purposive teaching of strategies for the benefit of the other collaborator.

8. Verbal active following. This variable codes the deliberate verbal reactions of one member of the dyad to the statements of the other.

9. Nonverbal active following. This variable, similar to verbal active following, codes the deliberate nonverbal reactions of one member of the dyad to the statements or actions of the other.

10. Passivity. This variable indicates the child's lack of active involvement which includes aimless watching, indifference in the collaboration or the task, doing just mechanical work such as drawing a line under the direction of the other, and off-task behavior.

11. Symmetrical style of interaction. This variable codes the dyad and indicates the balance of involvement of the target child with the partner in terms of decision-making and related activities. Symmetrical style of interaction was coded when children showed equal involvement.

12. Asymmetrical style of interaction. This variable also codes the dyad and indicates that one child dominated decision-making and related activities.

The derived collaborative code was defined as follows:

13. Average planning unit. This variable indicates relatively advanced planning and is calculated by dividing the total number of stores visited by the total number of moves (one-step or sequence). This variable ranged from 1 to 6.

A measure of performance on the entire planning task was derived as follows:

14. Plan efficiency. This measure of efficiency, or degree of skilled task performance, is the length of the route in imaginary street blocks, with shorter lengths of route indicating higher efficiency. The shortest route was always 32 blocks.

Reliability

All variables were tested for reliability. Collaborative sessions for ten dyads (25 percent) were randomly selected and coded by two independent judges, the main coder and the first author of this research. Cohen's Kappa, calculated across the sequence of every coded move to a destination for the set of 10 dyads (i.e., 60 events), ranged from 0.57 to 1.00 to (M = .88) across the 12 collaborative variables. Lower reliabilities were observed were behaviors with the lowest frequencies, including strategic thinking aloud (partner = .58, dyad = .57), verbal active following (dyad = .68), and nonverbal active following (dyad = .68). All other coefficients were above .70, indicating acceptable reliability given the conservative nature of Kappa (Bakeman & Gottman, 1997, p. 66).

Results

In all collaborative sessions children spoke English when the dyad had an American partner, and Japanese was always spoken, without prompting by the experimenter, when both of the collaborators were Japanese. The collaborative sessions (Phase 2 and 3 together) took between 3 minutes 1 second and 20 minutes 11 seconds across the 40 dyads. Within each group, the average time per collaborative session were: 3 minutes 46

seconds for younger Japanese partner dyads; 3 minutes 34 seconds for older Japanese partner dyads; 4 minutes 13 seconds for younger American partner dyads; and 3 minutes 40 seconds for older American partner dyads.

Relation of plan efficiency to partner condition

The purpose of creating four partner conditions was to determine if partner skill (indexed by partner age) and ethnicity would influence transfer of skill from the collaboration experience to the younger child's independent planning. First it must be established that the manipulation of partner age was a valid proxy measure of partner skill. To this end, we will first present plan efficiency data for the younger and older partners.

Mean scores on plan efficiency (number of blocks in drawn route) and the joint planning process (collaborative) variables are presented in Table 1. As expected, the average route length of older partner children at pretest was shorter, by 4.7 blocks, compared to younger children, F (1, 36) = 4.342, p = .044. An unexpected interaction between age and ethnicity of partner was also found, F (1, 36) = 7.61, p = .009. There was a reliable difference between older and younger Japanese partners at pretest (35.8 and 45.5, respectively; p < .05), but a similar difference was not found for older and younger American partners (41.0 and 40.8, respectively). The average collaborative performance of dyads showed only a reliable age effect, where dyads with older partners showed routes shorter on average by 5.2 blocks, F (1, 36) = 8.19, p = .007. Also, the posttest performance of partners showed only an age effect, with older partners demonstrating routes shorter on average by 6.5 blocks, F (1, 36) = 7.13, p = .011. Collectively, the data indicate that indeed the older partners were more skilled at map planning than were younger partners.

Table 1 Means (and SDs) for performance and process variables across partner conditions.

Partner condition	American		Japanese		
Measure	Young	Old	Young	Old	Effect
Plan efficiency scores					
Phase 1 target	41.2 (8.0)	44.2 (5.5)	43.8 (8.3)	44.2 (9.4)	
Phase 1 partner	40.8 (6.4)	41.0 (5.4)	45.4 (11.2)	35.8 (2.7)	A, A × E
Phase 2 collabor.	44.0 (8.6)	38.2 (4.9)	40.6 (5.6)	38.4 (7.5)	A#
Phase 3 collabor.	45.3 (6.8)	39.6 (5.6)	45.6 (5.3)	38.4 (3.8)	A
Phase 4 target	39.0 (6.0)	44.2 (6.7)	44.0 (7.6)	38.4 (3.9)	A E
Phase 4 partner	44.8 (6.4)	38.9 (6.9)	43.6 (9.7)	37.4 (4.6)	A
Collaborative variables: Partner					
Verbal exploration	3.70a (1.8)	5.40 (0.8)	2.50 (1.9)	4.25 (1.8)	A,E
Nonverbal exploration	3.10 (1.7)	3.60 (1.9)	3.65 (1.3)	4.00 (1.8)	
Strategic thinking	0.95 (1.3)	1.85 (2.0)	0.15 (0.2)	1.40 (2.0)	A
Tutorial quality	0.00 (0.0)	0.75 (1.9)	0.00 (0.0)	0.45 (0.6)	A#
Collaborative variables: Target					
Verbal active follow	1.90 (2.2)	3.05 (1.8)	1.75 (1.7)	2.90 (2.0)	
NV active follow	1.90 (2.1)	2.65 (2.1)	1.65 (1.8)	2.60 (2.0)	
Passivity	1.35 (1.4)	1.45 (2.2)	0.40 (0.5)	1.30 (1.6)	
Collaborative variables: Dyad					
Joint decision making	1.40 (1.5)	2.10 (2.5)	1.80 (1.4)	2.70 (2.0)	
Symmetry	3.90 (1.9)	4.30 (2.2)	4.90 (0.9)	4.40 (2.0)	

Note. Plan efficiency is a measure of efficiency represented by the number of blocks traveled on the map in the errand planning task; smaller values indicates higher efficiency, and optimal performance is 32. Process variables are scaled from 0 to for all variables. "A" indicates a significant partner age effect (p <.05); "A#" indicates a marginal partner age effect (.05 < p <.1). "E" indicates a significant partner ethnicity effect (p < .05). A × E indicates an age by ethnicity interaction effect.

To test the effect of type of collaborator on target children's independent posttest performance, a 2 X 2 factorial analysis of variance was first conducted, with partner ethnicity and partner age as independent variables. The only reliable effect was the interaction of partner ethnicity and age, F (1, 36) = 7.61, p = .009. As illustrated in Table 1, the best performance was shown by younger Japanese children paired with older Japanese partners (38.4 blocks) and, unexpectedly, by young Japanese children paired with young American partners (39.0 blocks). When comparing pretest to posttest performance, however, the only reliable decrease in average route length was for target children paired with older Japanese partners. These younger Japanese children decreased their route length an average of 5.8 blocks, from 44.2 to 38.4; t(9) = 2.0, p = .039, one-tailed. Thus, it appears that the younger Japanese children benefited from collaboration only when paired with older children of the same ethnic background.

Participation of younger children in joint decision making

Following Radziszewska and Rogoff's analyses (1989, 1991), we examined more closely the collaboration of children and their partners to assess the extent of sharing of decision-making and its relation to posttest performance. For the first analysis, we examined key partner behaviors to see the extent to which partners were providing guidance and support for the acquisition of skills by the target children. The second quarter of Table 1 displays the mean and standard deviations for four variables we hypothesized would differentiate the four partner conditions: Partner verbal exploration, partner nonverbal exploration, partner strategic thinking aloud, and partner tutorial quality. Analysis of variance revealed significant age effects for partner verbal exploration (F(1, 36) = 10.81, p = .002) and strategic thinking aloud (F(1, 36) = 4.67, p = .038); a marginal age effect for tutorial quality (F(1, 36) = 3.62, p = .065); and a significant ethnicity effect for verbal exploration (F(1, 36) = 5.01, p = .031). These effects show that older partners provided more guidance than younger partners, and also that American partners provided more guidance in the form of verbal exploration compared to Japanese partners. No other main effects or interactions were reliable.

Next, we examined a set of target child collaborative variables intended to measure the extent and manner in which these young Japanese children were taking up the guidance provided by the partner children: Target child verbal active following, target child nonverbal active following, and target child passivity. These means are displayed in the third quarter of Table 1. Analyses of variance, however, showed no reliable effects of partner age and ethnicity on these three variables.

For a third set of analyses we coded the dyad's collaborative performance in terms of joint decision making and symmetry of interaction. Table 1 shows that joint decision making ranged from a low of 1.4 (out of 6) for children paired with young American partners, to a high of 2.7 for children paired with older Japanese partners. Analysis of variance yielded no differences across means due to partner ethnicity or age. Nonetheless, we note that the variance of joint decision making is quite high, especially within the group of children with older American partners (SD = 2.48), and there is a positive skew of scores for dyads with American partners. The median scores, therefore,

may be better measures of typical performance within groups. Median joint decision making, on a scale of 0 to 6, was 1.06, 0.75, 1.75, and 3.50 for dyads with young American, old American, young Japanese, and old Japanese partners, respectively. Note that the value for dyads with older Japanese partners is almost 5 times the level for dyads with older American partners.

Symmetry of involvement of both children on the planning task occurred on about 4 or 5 of the 6 decisions on each shopping trip. Children paired with young American partners showed the least symmetry (3.9), and children with older Japanese partners showed the greatest symmetry (4.9). However, an analysis of variance revealed no significant main effects or interactions between symmetry and the group factors of ethnicity or age of partner.

Correlations between collaborative process variables and target child's plan efficiency

Table 2 presents the correlation between the target children's plan efficiency (i.e., number of blocks traveled on a drawn route) on the posttest and variables that measure the nature of children's collaboration (summarized in the previous sections). Since a low number of blocks in the drawn route indicates better planning efficiency, we expected to see negative correlations for any collaborative variable that indicates the communication of planning skills, such as verbal exploration, nonverbal exploration, and joint decision making. These correlations are shown for the Japanese-Japanese dyads, the Japanese-American dyads, and for the entire sample. The only reliable correlation was between the Japanese partner's verbal exploration and their Japanese target collaborator's posttest plan efficiency, r = -0.49, indicating that higher verbal exploration was associated with better posttest performance. This association of partner verbal exploration and target posttest performance was not observed for American children paired with Japanese children (r = .12; not significant), although we note that, overall, American partners showed more verbal exploration compared to Japanese partners (American M = 4.56; Japanese M = 3.38).

Table 2 Correlation of target children's posttest plan efficiency scores with collaborative variables.

Variables	J-J dyads n = 20	J-A dyads n = 20	All dyads n = 40
Partner verbal exploration	-.49*	.12	-.19
Partner nonverbal exploration	-.16	.09	-.03
Partner strategic thinking aloud	-.23	-.28	-.25
Partner tutorial quality	-.35	.21	.06
Target verbal active following	-.22	.08	-.06
Target nonverbal active following	-.17	.02	-.07
Joint decision making	-.36	.38	.04
Symmetrical style	.17	.31	.24

Note. J-J = Japanese-Japanese; J-A = Japanese-American. Significance is indicated as * (p < .05)

A final chi-square analysis was performed, comparing the pattern of correlations (positive or negative) across the two partner conditions (American or Japanese), to see if there is an association between (a) the relation between collaboration and performance and (b) the ethnic category of the older partner child. It is clear from inspection of Table 2 that the Japanese partner condition is associated with far more negative correlations compared to the American partner conditions. In other words, stronger measures of collaboration (e.g., partner guidance, target active following, target participation) is generally associated with better target performance when the dyads are Japanese-Japanese, but not when the dyads are Japanese-American. Using each of the 8 variables shown in Table 2, a Fisher exact test of the 2 X 2

contingency showed a reliable association between correlation direction and ethnicity, p = .01.

Discussion

Our major finding was that seven-year-old Japanese children showed greater improvement in plan efficiency following collaboration with nine-year-old Japanese children. This is consistent with the view that young children learn cognitive skills best from interactions with those who have both better skills and shared social affordances. We reason that mere exposure to efficient planning, in the absence of a shared cultural style of interaction, was not enough for the young Japanese children to acquire higher planning efficiency. Their American collaborators may not have provided an effective context or social support for efficient planning. Furthermore, collaboration with the same-aged peers who did not have better planning efficiency did not lead to improvements in target children's performance.

Thus, both better planning skills of partners and common social affordances between the members of dyads seem to be necessary for young Japanese children to acquire better planning skills. When children collaborate, they are more likely to learn skills relevant to the task if they share unstated social affordances– expectations about appropriate actions in the setting, expectations about what is desirable to do and what is not, how their intentions should be expressed and exchanged, and so forth. This finding supports Vygotsky's cultural-historical theory that children develop cognitive skills through the social interaction with others, especially those who possess culturally-valued skills. Vygotsky (1978) viewed social context as essential for learning and, moreover, steering the course of development. The present study suggests that both exposure to skilled behavior and shared social affordances may be important for social learning.

It is not clear what specific social affordances are most relevant for the children's collaborative learning in this study, but as we explain below, this investigation points to the cultural fit between verbal exploration and interpersonal attention. We found that nine-year-old American children verbally explored more than same-aged Japanese children when they collaborated with seven-year-old Japanese children in the imaginary errand planning tasks. The emphasis on a verbal interactive mode is common in various aspects in American culture, such as in mother-child relationships (Caudill and Weinstein, 1974), social cognition (Hess et al., 1986), and education (Tomizawa, 1988), whereas verbal emphasis is less in Japanese culture (Hess et al., 1986). Therefore, this finding is regarded as an accurate reflection of a primary difference in behavioral patterns between American and Japanese culture.

However, it was Japanese partners' verbal exploration that appeared to have a significant beneficial effect on the target children's posttest performance. There was no correlation between the American partner's behavior during collaboration and the Japanese target children's posttest performance. We suspect that verbal exploration by an older Japanese partner creates a different affordance for collaboration (i.e., interpersonal attention and mutual influence), with different consequences for cognitive development, compared to the same behavior by an older American partner. There was a suggestive pattern of correlations for Japanese-Japanese dyads

across a range of collaborative variables, but many of these occurred below the conventional level of reliability. Six collaborative variables– partner verbal exploration, partner nonverbal exploration, partner tutorial quality, target verbal active following, target nonverbal active following, and joint decision making– showed a stronger association with the Japanese target's posttest scores when the partner was Japanese rather than American. When Japanese partners intentionally involved the Japanese target children (e.g., by tutoring and seeking agreement on decisions on moves) the target children performed better on the posttest. On the other hand, this association of collaboration and target performance was not observed for the Japanese-American dyads. Although we did not directly measure the quality of ideas and advice of partners in the present study, it is possible that qualitative differences in collaboration may account for some of the difference between Japanese-Japanese and Japanese-American performance. Future investigations should examine more closely these important qualitative differences in collaboration in mixed ethnicity dyads.

One may argue that these cultural differences could be explained by other variables such as language skill or general intelligence. Although we selected groups believed to be competent in the English language and equivalent in academic achievement, we did not measure nor directly control these variables. All the same, the observed group differences are informative in themselves. The young Japanese children in this study are representative of other children like them, and English language skill differences, if they exist, would be part of what it means to be Japanese-American. Furthermore, an interpretation of performance differences based on hypothesized language comprehension differences is not consistent with the target children's collaborative behaviors, where there were no ethnicity differences. Japanese children showed the same levels of verbal active following and nonverbal active following when paired with American or with Japanese older children. The levels of joint decision making and a symmetrical style of interaction were the same across American and Japanese partners. These data are difficult to reconcile with the interpretation that the younger Japanese children simply had weak English language skills.

With regard to age differences, as predicted, older children demonstrated more active behavior than young children during collaboration. The older children verbally explored, verbalized strategic thinking, and took more initiative than young children. Tutorial quality was more frequently observed among older children (30%) than among young children (3%).

It is noteworthy that some older children, who showed tutorial quality during collaboration, transferred some task responsibilities to young children, from the first collaborative trial to the second collaborative trial. Thus, we can say that some children, ages nine and seven, were able to demonstrate guided participation (e.g., Rogoff, 1990). These planning skills appear to be within the young children's zone of proximal development (Vygotsky, 1978). This process took place not only in young Japanese-older Japanese dyads where target children's performance generally improved but also in a few young Japanese-older American dyads.

There were two interactional styles that lead to target children's improvement. One was a typical

collaborative pattern (e.g., Radziszewska & Rogoff, 1988, 1991). On the other hand, a *partner-dominated pattern* was seen only in older-younger Japanese boy dyads, and involved target children's observant and independent learning. In the dyads that demonstrated the latter pattern, verbal communication was minimal and the target children appeared passive. The target children rarely exhibited explicit exploratory behaviors. We reason that Japanese children who demonstrated a style of independent learning were not merely passive but *focused and observant*. When this is the case, independent learning may not necessarily be an inferior strategy. We suspect that children may use both learning styles over time and tasks, shifting the emphasis on each while adjusting to the circumstances.

The above findings may have implications for Japanese children's academic achievement. First, learning in American schools, where unfamiliar social affordances prevail, presents difficulty for many Japanese children. Learning difficulties may have adverse effects on popularity, interpersonal relationships, self-perception, and psychological well-being (Van Acker and Valenti, 1989; Taylor and Machida, 1994; Ladd, Kochenderfer and Coleman, 1996; Wentzel and Caldwell, 1997; Hartup, 1998), causing higher level of stress in addition to that caused by the general unfamiliarity with school routines and expectations.

For these reasons, it benefits young Japanese children to become not only bilingual but also bicultural. In order to achieve this, the parents of young Japanese children are advised to provide them with enhanced opportunities for interaction with American children from the earliest days of their lives so that they learn typical interactional patterns through play, home routines, and conversations. It may also be good for parents to reinforce, verbally and behaviorally, young children's verbal expressive and assertive behaviors when they are interacting with American children. Helping foreign-born children learn about the unspoken rules of interaction of the playgrounds and classrooms of their new country is important, no matter what age they immigrate.

Note

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