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Some Findings from the Japanese Early Communicative Development Inventory

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Purposes

The MacArthur Communicative Development Inventories (the CDI/Infants and the CDI/Toddlers) have been developed by Fenson, Dale, Reznick, Thal, Bates, Hartung, Pethick, and Reilly (1993) in U.S.A. as an instrument to assess the gestural and language development for infants and toddlers. They provide an efficient and valid means of assessing a wide range of language-based skills in infants and toddlers from parent's reports. There is a large body of evidence supporting the reliability, validity, clinical utility and research potential of the MacArthur Communicative Development Inventories. Currently, versions of the Communicative Development Inventories are available for Spanish (Jackson-Maldonado, Thal, Bates, & Gutierrez-Clellen, 1993), for Italian (Camaioni, Caselli, Logobardi, & Volterra, 1991; Caselli & Casadio, 1993), and for American Sign Language (Reilly, Provine, & Bellugi, 1993).

In Japan we do not have a good instrument to assess language-based skills for infants and toddlers. We use developmental tests to assess them. They have few language items for infants and toddlers. For example Kyoto Scale of Psychological Development provides only five language items for the age of 12-24 months. It will be valuable to develop a Japanese version of the MacArthur Communicative Development Inventory which is suited to Japanese customs and culture.

In this report the following issues will be reported.

(1) The establishment of the Japanese Early Communicative Development Inventory
(2) The major developmental trends and variability
(3) Comparisons within our data
    A. The comparison of baby-words with adult-words
    B. Sex differences
    C. The differences between home-reared children and day-care children
    D. Intercorrelations among the language and gestures
(4) Future plans

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Method

Inventory:

In the Japanese version of the MacArthur Communicative Development Inventories, Infant form and Toddler form were combined. The Inventory is divided into two parts; "Actions and Gestures" and "the Early Words and Word Combinations".

"Actions and Gestures" contains the same sections (First Communicative Gestures, Games and Routines, Actions with Objects, Pretending to be a Parent, Imitating Adult Actions, Pretend Substitutions) as those in the original inventories. Some items were deleted, modified, and added to match Japanese customs and culture in "Actions and Gestures" (Table 1). In the section "Pretend Substitutions", mother are requested to complete the sentence in examples for blocks, box, sand, paper and bowl.

In "the Early Words and Word Combinations", we have the section of "First Signs of Understanding", "Phrases", "Starting to Talk", Vocabulary Checklist of 475 words for 19 word group categories, "How Children Use Words", "Word Combinations" and "Examples of the Child's Three Longest Sentences". The words of Vocabulary Checklist mainly came from the CDI/Words and Gestures. We added the baby-words of animal sounds such as *gaga* (duck), *bubu* (pig), and *chunchun* (bird) etc, and of vehicle sounds such as *bubu* (car), *popo* (train), and *bun* (motorcycle), and food such as *gohan* (rice), *ocha* (tea), *misoshiru* (miso soup), *tofu* (bean-curd), *tomato*, and *kyuuri* (cucumber) etc. We dropped the words which we do not use, such as cherios, beads, bedroom, and high chair etc. Some different words in English such as *look* and *watch* were expressed in one word, *miru*. The Vocabulary Checklist of the Japanese version has the colums of "how the mother says the list word" and "how the child says the list word" and "he/she has never seen and/or heard the list word" (Fig.1) to get the children's words for revising the vocabulary checklist in the second version. We have not yet completed "Sentences and Grammar".

Subjects:

Data from 669 day-care children between the ages of 8 and 36 months was collected in Matsue city. There were 333 boys and 322 girls, and nonrespondents totalled 14 (Table 2). Parents completed the form at home. Parents received and returned the form through the day-care center. Mother answered 625 chidlren (93.4%), father answered 19 children (2.8%)

B. Animal Names (Real or Toy)

	Word	How mother says	Understands ○×	Says ○×	Says How child says	Never seen and/or heard
B1	animal					
B2	bear					
B3	bee					
B4	bird					
B5	bug					

Fig.1 Our form of Vocabulary Checklist for day-care children

Table 1 *The deleted items, the modified items and the added items*

US No.	Deleted items
A10	Blows kisses from a distance.
B3	Play 'so big'.
Phrases	This little piggy.
US No.	**Modified items**
A9	Requests something by extending arm and opening and closing hands. → putting one palm upon another palm
A12	Shrugs to indicate "all gone" or "where 'd it go". → Tilts his/her head
C8	Puts on a necklace, bracelet, or watch. →delete bracelet
Japan No.	**Added items**
T10	Bows if she/he is told to do.
T11	Raises his/her hands if someone says "banzai"(hurrash).
T14	Points the picture if he/she is asked "where is ___?" when he/she reads a picture book.
U3	Rolls back the ball if someone rolls a ball to him/her.
V18	Wear shorts.
X16	Pretend to smoke a cigarette.

Table 2 *Sample characteristics (Day-care children)*

Age	Boys	Girls	M*	Age	Boys	Girls	M*
8	4	4	2	23	13	12	
9	5	11		24	11	12	
10	6	10		25	12	11	
11	14	11		26	15	14	1
12	16	11	2	27	11	9	
13	9	6		28	10	15	
14	17	11	1	29	17	11	1
15	7	15	1	30	9	6	
16	13	13		31	12	14	
17	7	10	1	32	6	13	1
18	10	16	1	33	19	11	1
19	13	8		34	9	12	1
20	13	11		35	19	8	
21	9	22	1	36	11	8	
22	16	7					
				Total	333	322	14

* M means missing.

and missing was 22 (3.2%). The first born children were 261 (39.0%), the second born children were 268 (40.1%), the third born children were 118 (17.6%), fourth born children were 12 (1.8%), fifth born child was 1 (0.14%), and missing were 9 (1.3%). For another study we collected the data of seventy home-reared children aged 10, 12, 15, 18, 21, 24, and 27 months in Matsue city. We will use this data as a comparison with the day-care children.

Analysis:

Mainly the data was processed as 0-1 data. "Not yet" or "No" were processed as 0, and "Sometimes", "Often", "Yes" or"Did before but not now" were processed as 1.

Results and Discussions

We will report the data analysis we finished so far. We have not analyzed Three Longest Sentences and the response for each word in the Vocabulary Checklist.

(I) *Establishment of the Inventory*

We examined the percentage of "yes" answers for each item at each month in the day-care children. The number of items whose occurrence exceeded 50% by the age of 16 months, 17-20 months, 21-24 months and after 25 months for each section were listed in Table 3. One item (Feed with bottle) in Section D ("Pretending to be a Parent") and two items (*Type at a typewriter or computer keyboard,* and *Wash dishes*) in SectionE ("Imitating Adult Actions") reached 50% by the age of 24 months for home-reared children. Three items in Section D (*Pat or burp a doll or stuffed animal. Push in stroller/buggy. Try to put diaper on a doll or stuffed animal.*) and two items in Section E (*Attempt to use saw. Pretend to smoke a cigarette.*) did not reach 50% at 24 months for day-care children or home-reared children. These items did not show developmental trends. We decided to delete these five items from the Japanese Early Communicative Development Inventory. We established the sections and the numbers of items for Japanese Early Communicative Development Inventory illustrated in Table 4.

Cronbach's coefficients alpha for internal consistency were very high for each sections for the day-care children between 8-24 months (Table 5).

Table 3 *The number of items for ≧ 50% of the sample at each age range*

Sections	By 16 months	17-20 months	21-24 months	After 25
Gestures				
Section A	13	1	0	0
Section B	5	1	0	0
Section C	13	3	2	0
Section D	2	1	6	4
Section E	9	2	1	4
Early Words Phrases	24	3	0	0
How to Use Words	1	2	2	0

Table 4 *The Japanese Early Communicative Development Inventory*

Part I : Actions and Gestures	
Sections	Numbers
Section A: First Communicative Gestures	14 items
Section B: Games and Routines	6 items
Section C: Actions with Objects	18 items
Section D: Pretending to be a Parent	10 items
Section E: Imitating Adult Actions	14 items
Section F: Pretend Substitutions	

Part II : Early Words and Word Combinations		
Sections		Numbers
Section A	First Signs of Understanding	3 items
Section B	Phrases	27 items
Section C	Starting to Talk	2 items
Section D	Vocabulary Checklist	475 items
	(Vocabulary Production, Vocabulary Comprehension)	
Section E	How Children Use Words	5 items
Section F	Word Combinations	3 items
	Word chain(content word plus article)	
	Two words together	
	Three words together	
Section G	Three Longest Sentences	

Table 5 *Cronbach's coefficients alpha*

Sections	Alpha Coefficients
First Communicative Gestures	.890
Games and Routines	.795
Actions with Objects	.940
Pretending to be a Parent	.893
Imitating Adult Actions	.908
Total Gestures	.974
Phrases	.956
Vocabulary Comprehension	.958
Vocabulary Production	.956
How to Use Words	.850

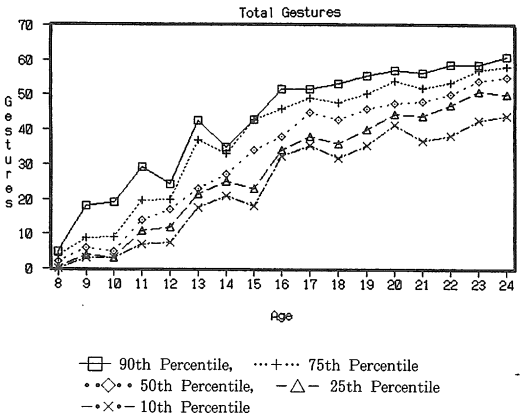

Fig.2-1 Percentiie graphs based on actual scores for total gestures(Section A-E)

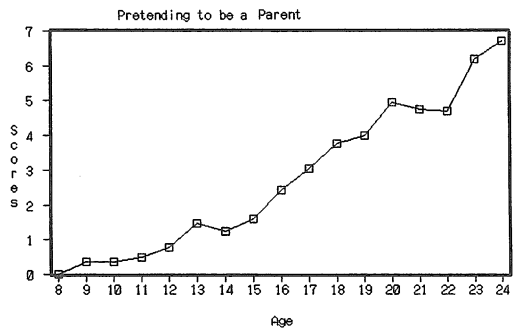

Fig.2-2 Means by month for Pretending to be a Parent(Section D)

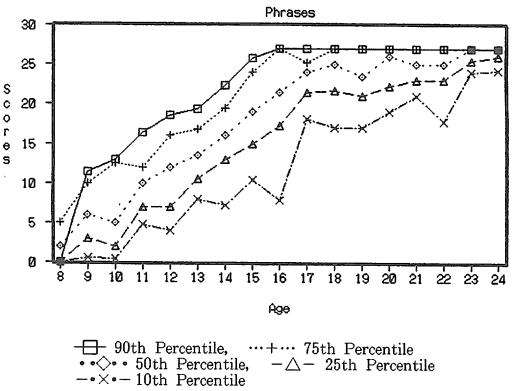

Fig.2-3 Percentile graphs based on actual scores for Comprehension of Phrases

(II) *The major developmental trends and variability*

We found great variability among children for "Actions and Gestures" and "Early Words and Word Combinations".

Fig.2-1 shows the actual values at the 10th, 25th, 50th, 75th, and 90th percentiles for total gestures (Section A-E). Fig.2-2 shows the monthly mean for Section D ("Pretending to be a Parent"). After 16 months the scores for gestures increase.

From these results we think "Actions and Gestures" will continue to provide important information after 16 months.

Fig.2-3 shows the actual values at the 10th, 25th, 50th, 75th, and 90th percentiles for common phrases reported as understood by infants. After the age of 17 months, this section showed no further increase.

Fig.2-4 and 2-5 show the actual values at the 10th, 25th, 50th, 75th and 90th percentiles for vocabulary comprehension and production, respectively. Vocabulary comprehension and production increase with age. We requested the parent to write how the mother says the list word and how the child says the list word. Vocabulary comprehension is the understanding of mother's way of speaking. If the mother says *'moo'* for cow and child understands *moo*, the mother gave a circle (yes response) for the understanding of cow.

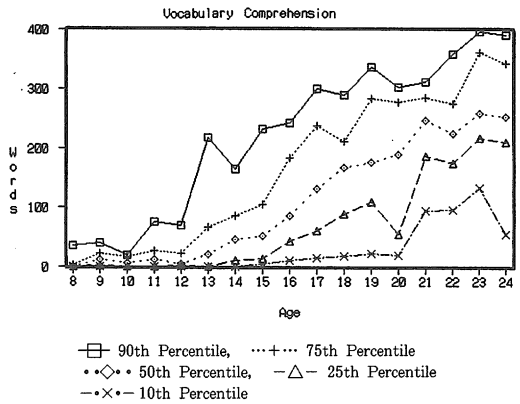

Fig.2-4 Percentile graphs based on actual scores for Vocabulary Comprehension

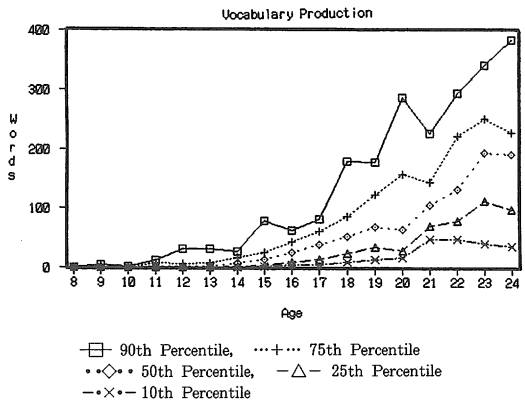

Fig.2-5 Percentile graphs based on actual scores for Vocabulary Production

Vocabulary production is the child's way of speaking. If the child says *'wanwan'* for dog and mother gave a circle for saying *'dog'* (yes response), the list word of *'dog'* obtained a score for production. We counted the numbers for which the mother gave a circle (yes response) for comprehension and production. And so the numbers of vocabulary comprehension and vocabulary production do not exactly correlated with the list words because they are based on the mother's and child's way of speaking. We will revise the vocabulary checklist on the basis of information about the child's way of speaking and the observational data etc. in the next step.

Fig.2-6 shows the regular progressions in parents' responses to three items of word combinations. The first item is the word-chain (content word plus particle, such as the question "Does your child attach the particle (joshi) after the word, such as "With Daddy (*papa to*) ?". The second item is two words together such as the question "Does your child combine two words together, such as "Daddy office (*papa kaisha*)" or "Bring car (*bubu totte*) ?". The third item is three words together such as the question "Does your child combine three words together, such as "Daddy gone office (*papa kaisha itta*) ?". The responses for the word-chain and two words together showed the similar developmental trends. From 17 months the children began to combine words. The percentage answering "yes" reached 50% at 21 months for word-chain, at 22 months for two words together and at 23 months for three words together. This result shows that the first step of word combinations for Japanese children is word plus particle as well as two words together.

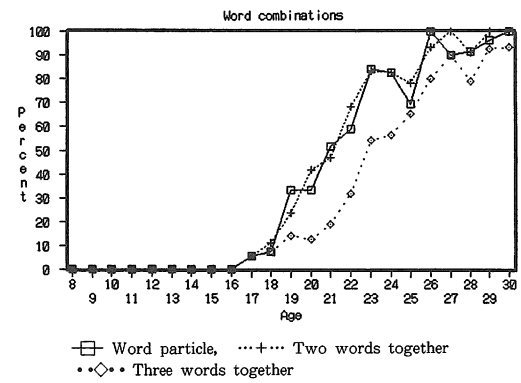

Fig.2-6 Percentage of children answering "yes"at each month for combining words

(III) *Comparison within our data*

(A) *The comparison of baby-words with adult-words*

Japanese children and mothers often use baby-words at the beginning of language development. We examined the transition from baby-words to adult-words for 103 words of categories of Animals, Vehicles,

Toys, and Food and Drink of this Vocabulary Checklist for 179 children between 10 and 36 months. We classified parental reports of the colum "how your child says the list words" into three categories (Table 6). First is baby-words whose forms are mainly onomatopoeia and the repetition of same sounds such as *nyannyan* (cat) and *taitai* (fish). The second is the modification of adult-words whose forms are misarticlation of adult-words such as *shakana* (fish). The third is adult-words whose forms are conventionally used by Japanese adults such as *neko* (cat) and *sakana* (fish). The children began to produce adult-words at the age of 15 months (Fig.3-1). The changing proportion of total vocabulary are shown in Fig.3-2, and illustrates this major transition in early Japanese vocabulary. Transition points of baby-words to adult-words occurred at around 21 months. Werner & Kaplan (1963) pointed out that as the child advances from his "idiomorphic" speech, or his "baby language", to conventional speech, one would not expect that this marked increase in distance between vehicle and referent would occur abruptly. The present result showed that the process of distancing between vehicle and referent occurred during the second year of life.

Table 6 *Classification of baby-words and adult-words*

Categories	Definition	Example
Baby-words	Onomatopoeia	inu→*wanwan*
	Repetition of sound (syllable) of part of list word	tori→*toto*
	Onomatopoeia plus suffix	ushi→*mochan*
	Onomatopoeia instead of list word	udon→*zozo*
Modification of adult-words	Misarticulation of list word	sakana→*shakana*
	Repetition of list word	pan→*panpan*
	Misarticulation of list word plus suffix	saru→*sharushan*
	Misarticulation of modified word instead of list word	pen→*epitsu*
Adult-words	Same as list word	inu→*inu*
	Prefix(o) plus list word	niku→*oniku*
	List word plus suffix (san,chan)	kuma→*kumasan*
	Adult word instead of list word	pen→*enpitsu*

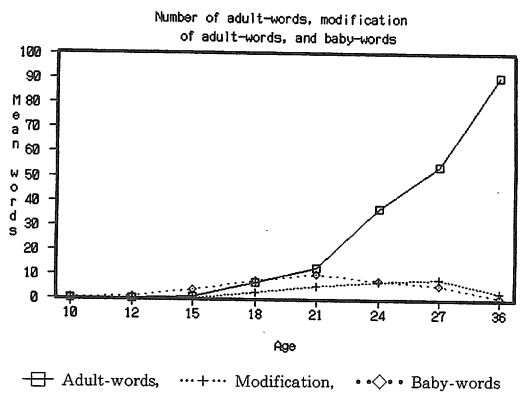

Fig.3-1 Means of adult-words, modification of adult-words, and baby-words

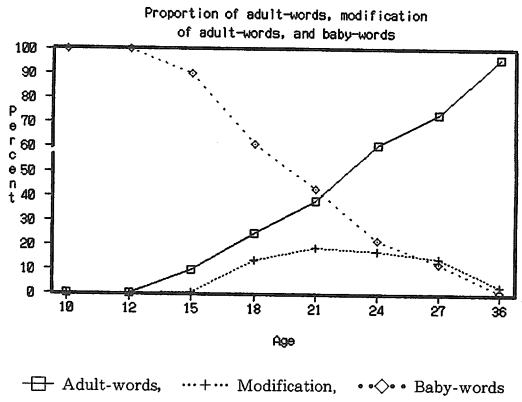

Fig.3-2 Proportion of adult-words, modification of adult-words, and baby-words for total production

(B) *Sex differences in day-care children*

In Anova of two factors (age and sex), girls showed significantly higher scores in the section of "First Communicative Gestures", "Games and Routines", "Pretending to be a Parent", "How to Use Words", and vocabulary production for the children from the age of 8 months to 24 months. In the section of "Actions with Objects" and total gestures, interactive effects between age and sex were significant. In the section of "Actions with Objects", the girls of 16, 18, and 22 months old, and in total gestures, the girls of 13, 18 and 22 months old showed significantly higher scores than boys (Fig.4-1, 4-2). The result of Section D ("Pretending to be a Parent") will be especially interesting (Fig.4-3). The difference between girls and boys was large after 18 months and showed Japanese girls more engaged in doll play than boys. This result reflects cultural differences that Japanese mothers recommend for girls to play with doll and for boys to play with vehicles. Also after 18 months girls produced more words than boys (Fig.4-4).

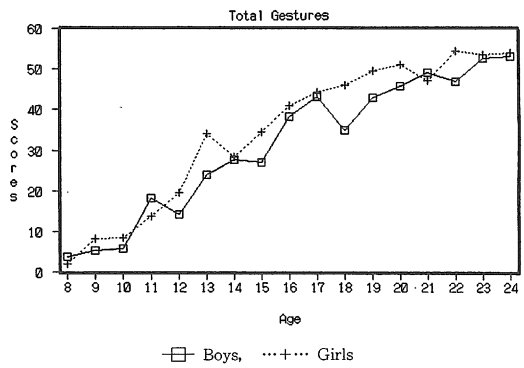

Fig.4-1 Means by month for total gestures (Section A-E) reported for boys and for girls

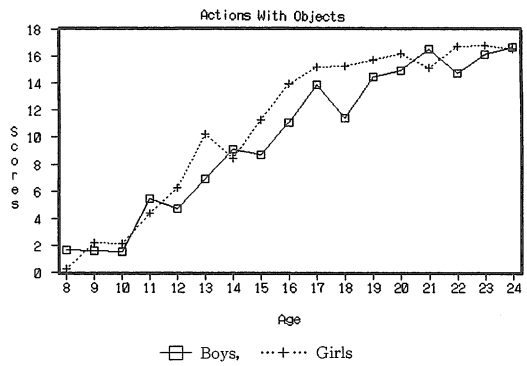

Fig.4-2 Means by Actions with Objects (Section C) reported for boys and for girls

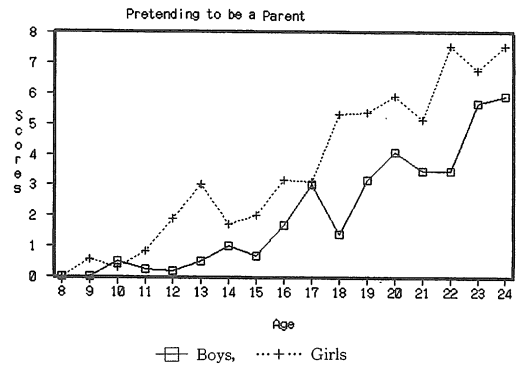

Fig.4-3 Means by month for Pretending to be a Parent (Section D) reported for boys and for girls

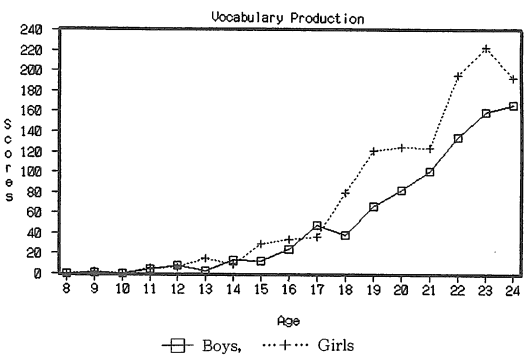

Fig.4-4 Means by month for Vocabulary Production reported for boys and for girls

(C) *The differences between home-reared children and day-care children*

In the Part of Actions and Gestures, each section showed similar developmental trends for day-care children and home-reared children of the ages 10, 12, 15, 18, 21, 24 and 27 months old. The sections and months which showed significant differences between day-care children and home-reared children, were listed in Table 7-1 and 7-2. In all sections which showed the differences significantly, the scores for home-reared children were higher than the day-care children. One main factor of these differences may be caused by environmental factor. In the sections of "First Communicative Gestures" and "Actions with Objects", and total gestures, the home-reared children of the ages 10 and 12 months showed higher scores than day-care children (Fig.5-1 for total gestures). Another possible factor of the differences between home-reared and day-care children may be that the mothers of day-care children are not aware of the early development of the children's behavior because they are busy and do not spend much time with their children. "Imitating Adult Actions" showed significantly higher scores for the age of 12, 18, 21, and 24 months than home-reared children (Fig.5-2). This result may reflect that the section of "Imitating Adult Actions" includes the items of the actions which are more often observed at home. The result of "How to Use Words" showed that home-reared children were significantly more advanced than day-care children (Fig.5-3).

In Matsue city the proportion of day-care children from 0 month to 24 months is about 20%. We must collect data from home-reared children for norming study.

Table 7-1 *Sections which showed the differences significantly between day-care and home-reared children in the Part of Actions and Gestures*

Sections	Home-reared children			Day-care children		t	P
	Age	N	Mean	N	Mean	values	
Total Gestures	10	9	15.44(10.67)	14	7.28(6.23)	2.209	*
	12	10	24.80 (5.97)	25	16.40(7.84)	2.961	**
First Communicative Gestures	10	9	6.55(3.60)	16	3.81(2.19)	2.269	*
	12	10	8.80(2.09)	28	6.85(2.22)	2.358	*
Actions with Objects	10	10	4.40(3.59)	15	1.86(2.19)	2.098	*
	12	10	7.80(2.14)	27	5.25(2.83)	2.506	*
Pretending to be a Parent	18	10	6.20(2.82)	27	3.77(3.00)	2.150	*
	21	10	7.30(3.12)	31	4.74(3.15)	2.182	*
Imitating Adult Actions	12	10	4.20(2.78)	28	1.53(2.02)	3.131	**
	18	10	10.40(3.27)	27	7.62(3.02)	2.353	*
	21	10	11.60(1.26)	29	8.96(3.05)	2.585	*
	24	10	13.30(.67)	22	11.09(1.92)	3.424	**
Pretending	24	10	4.30(1.05)	23	2.60(1.85)	2.621	*
	27	10	4.50(1.71)	20	2.80(2.01)	2.210	*

** P<.01, * P<.05 ( ) means SD.

Table 7-2 *Sections which showed the differences significantly between day-care and home-reared children in the Part of Early Words*

Sections	Home-reared children			Day-care children		t	P
	Age	N	Mean	N	Mean	values	
Vocabulary Production	21	10	191.8(140.8)	32	107.9(64.7)	2.537	*
	24	10	285.0 (78.6)	23	174.8(114.3)	2.689	*
Vocabulary Comprehension	12	10	46.0(50.6)	29	17.9(25.2)	2.212	*
	21	10	322.7(77.2)	32	227.7(80.2)	3.215	**
	24	10	337.9(58.3)	23	255.1(112.3)	2.136	*
How to Use Words	18	10	2.80(1.47)	27	1.59(1.21)	2.455	*
	24	10	4.80(.42)	22	3.86(1.32)	2.125	*
Phrases	21	10	26.50(.97)	29	24.93(2.18)	2.141	*
			Percent		Percent	(χ^2 values)	
Labelling	18	10	90%	25	52.0%	4.417	*

** P<.01, * P<.05 ( ) means SD.

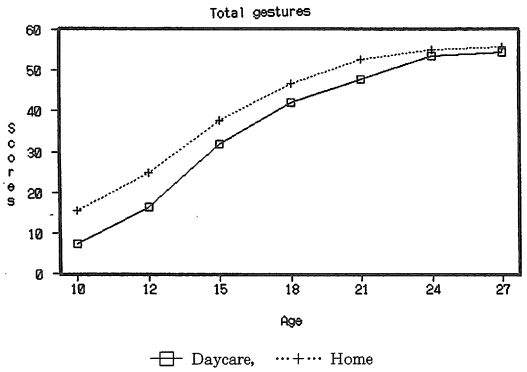

Fig.5-1 Means by month for total gestures reported for day-care children for home-reared children

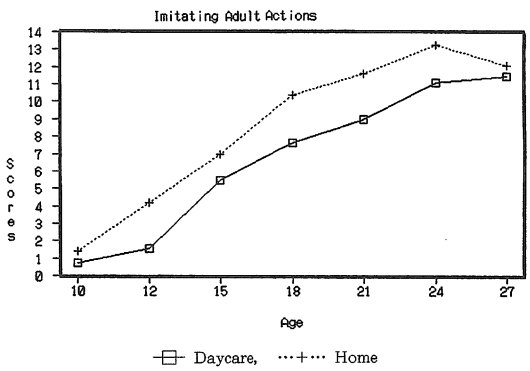

Fig.5-2 Means by month for Imitating Adult Actions (Section E) reported for day-care children and for home-reared children

(D) *Intercorrelations among the language and gesture measures*

Table 8-1 and 8-2 show the intercorrelations among the language and gesture measures for 8-16 months and 17-24 months, respectively. When we see the correlations with age partialed out, gestures were most associated with Phrases and secondly associated with How to Use Words for 8-16 and 17-24 months. The correlations between Vocabulary Comprehension and Vocabulary Production, between Vocabulary Production and How to Use Words were high 8-16 and 17-24 months. Phrases was more related to Vocabulary Comprehension than Vocabulary Production. Our data did not show gestures are more closely associated with vocabulary comprehension than with vocabulary production. English

data (Fenson et al.,1993), Spanish data (Jackson-Maldonado et al.,1993) and Italian data (Caselli and Casadio, 1993) for 8-16 months showed gestures were more correlated to vocabulary comprehension than vocabulary production.

The numbers of vocabulary production and comprehension in the Japanese version were based on the mother's and child's way of speaking. This may have caused the different correlation between gesture and language from the result in other language.

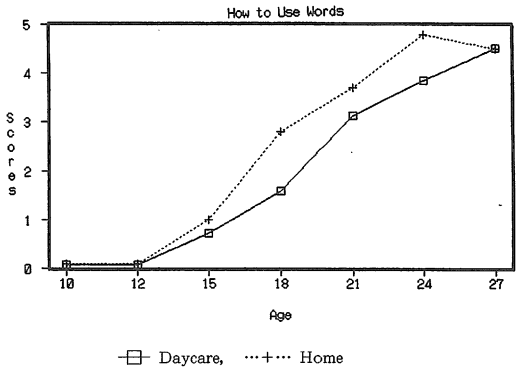

Fig.5-3 Means by month for How to use words reported for day-care children and for home-reared children

Table 8-1 *Intercorrelations among the language and gesture measures for 8-16 months*[a]

	Phrases	Vocabulary Comprehension	Vocabulary Production	How to Use Words	Gestures
Phrases		.566／.359	.519／.284	.574／.403	.816／.558
Vocabulary Comprehension			.752／.678	.532／.404	.573／.353
Vocabulary Production				.652／.558	.607／.429
How to Use Words					.602／.460
Gestures					

a : P<.05 for all values in this table.
Note: The second value in each pair is the correlation with age partialed out.

Table 8-2 *Intercorrelations among the language and gesture measures for 17-24 months*[a]

	Phrases	Vocabulary Comprehension	Vocabulary Production	How to Use Words	Gestures
Phrases		.478／.415	.360／.255	.408／.309	.523／.454
Vocabulary Comprehension			.759／.714	.517／.409	.573／.375
Vocabulary Production				.669／.550	.520／.366
How to Use Words					.582／.442
Gestures					

a : P<.05 for all values in this table.
Note: The second value in each pair is the correlation with age partialed out.

(IV) *Future plans*

We can adapt "Actions and Gestures" and one part of "Early Words" of the MacArthur Communicative Development Inventories for Japanese children without difficulty. But we will need to revise Vocabulary Checklist and to construct the part of "Sentences and Grammar". In the next step we will revise the Vocabulary Checklist from the observational data, the analysis of the colum of "how the child says the list word", and the references about lexical development and syntactical development for Japanese children. We will add baby-words in the category of Sound Effects and Animal Sounds. For action words we will revise the list words which Japanese children often use. It is difficult to decide which inflectional form to use for action words in the vocabulary list. It will be more problematic to make the part of "Sentences and Grammar". We must examine the structure of Japanese and the early processes of syntactic development: predicate inflections of verbs and adjectives, and the usage of particles and auxiliary verbs etc. It will take more time to revise the Japanese Early Communicative Development Inventory. When we complete the part of "Sentences and Grammar", we will prepare two forms: "Words and Gestures", and "Words and Sentences". About the ages for adapting two inventories, "Gestures and Actions" will provide important information till about 24 months, and the children began to combine words from 17 months. For this reason, we have not decided what ages to divide the two inventories.

For the norming study, we will collect the data of the home-reared and day-care children in Nagoya, Kyoto and Matsue.

Notes

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The present paper includes the parts which were already published in Japanese, Ogura,T, Yamashita, Y. & Murase, T.(1991) and Ogura,T., Murase, T. & Yamashita (1992).

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