A Developmental Study of Social Behavior in Infancy[1)]

Kiyobumi KAWAKAMI[2)]

Summary

The data in this paper come from three longitudinal studies on the development of social behavior in infancy. The three studies consist of one year's observations of two institutionalized infants (Study 1), of one home-reared infant (Study 2), and of twenty sets of home-reared twin infants (Study 3). From these studies two turning points in the development of social behavior were found —— 3 and 8 months of age. These findings are compared with other researchers' findings. After examining factors which bring about differences in development, the author thinks the relationships between infants and caretakers play an important role in the development of social behavior in infancy.

In this paper, three longitudinal studies will be summarized. The main theme of these studies is the development of social behavior in infancy. These three studies consist of one year's observations of two institutionalized infants in Study 1, of one home-reared infant in Study 2 (concerning Studies 1 & 2 cf. Kawakami now being printed), and of twenty sets of home-reared twin infants in Study 3 (concerning Study 3 cf. Suda & Kawakami now being printed). Study 3 was carried out with Osamu Suda, Toyoko Gakuen Jr. College, also in Tokyo.

The unique part of these studies is dividing infant behavior

into two categories, social behavior and non-social behavior. Social behavior is defined as person-directed behavior. This viewpoint recognizes social behavior even in newborn infants. It agrees with the results of recent studies on newborn infants' perception and cognition, which show that even newborn infants are social beings (e.g. Bower 1979, Parker & Rosenblatt 1979). So one of the themes of these studies is how the quality of infants' social abilities changes during the first year of life.

Method

1. Subjects: All were physically normal infants.

1) Study 1: A.N. (girl) and M.S. (boy) were institutionalized infants, who were born on the same day, but entered the same institution on different days.

2) Study 2: T.M. (boy) was living at home with his natural parents.

3) Study 3: Twenty pairs of home-reared twins, including 10 pairs of identical twins (MZ); 6 pairs of same-sexed fraternal twins (DZ); and 4 pairs of opposite-sexed twins (PZ), for a total of 24 boys and 16 girls.

2. Procedure

Observations in Study 1 were done at the institution, and observations in Studies 2 & 3 were done at infants' homes, in natural settings. So, not only the infants' behavior, but also the caretakers' behavior, were carefully noted.

In Studies 1 & 2: Observations of A.N. began at one week of age and continued up to 49 weeks of age; observations of M.S. began from 4 weeks and continued to 49 weeks of age; and observations of T.M. began from 10 weeks and continued to 54 weeks of age. Observations of each subject were made for a total of 150 minutes per week. In Study 3 observations were done at 2, 4, 6, 8, 10 and 12 months of age, for 60 minutes each month. Two male observers visited the twins' homes, and each observer recorded

the behavior of one infant during one visit.

In making observations the observer used a simple observation sheet on a clip-board with a stop watch mounted on the top. The observer sat near the infant and his participation in the infant's activities was minimal. When an infant smiled or vocalized to the observer he responded to the infant.

3. Observational indexes

In recording behavior a number of observational indexes were used, for example: 1) Spontaneous Smile, 2) Social Smile, 3) Vocalization, 4) Social Vocalization, 5) Caretakers' Touch and 6) Caretakers' Vocalization (includes Verbalization).

4. Observational reliability

The percentage of agreement between the two observers was almost always over the 70% level.

Results and discussion

1. Percentage of social behavior

Table 1 Percentage of Social Behavior

	Smiles				Vocalization			
Months	A.N.	M.S.	T.M.	TWINS	A.N.	M.S.	T.M.	TWINS
0	0.0				0.0			
1	8.7	0.0			24.0	0.0		
2	42.9	16.7		32.7	27.1	0.0		49.1
3	72.0	10.3	72.4		33.3	13.8	30.8	
4	51.2	44.0	91.9	82.7	23.1	5.9	19.8	39.9
5	86.4	44.2	100.0		19.7	9.4	37.0	
6	76.3	85.0	97.8	98.3	16.2	42.9	11.7	34.0
7	93.8	100.0	100.0		13.8	13.7	19.1	
8	85.0	100.0	94.9	96.3	21.3	16.3	21.7	35.8
9	82.2	91.7	94.1		26.5	9.5	24.4	
10	90.9	81.8	93.3	93.9	10.7	17.6	13.8	33.1
11	100.0	100.0	90.3		10.2	16.7	21.1	
12			96.9	96.3			17.4	46.6

Table 1 shows the percentage of social behavior in total behavior, such as in Smiles (includes Laughs) and Vocalization at each month of age. For example, in Vocalization, the desired percentage is calculated by (Social Vocalization)/{(Social Vocalization)+(Other Vocalization)} × 100. Through the three studies it is certain that the percentage of Social Smiles among all Smiles was large from the early stages of observation, but that the percentage of Social Vocalization among all Vocalization was small throughout the year. The percentage of Social Smiles increased dramatically at 3 months of age. This shows that the development of social behavior has one important turning point at 3 months of age. *The first turning point is at 3 months of age!*

From the comparison of the percentage of social behavior in Smiles and Vocalization it may be possible to understand the origins of behavior. In our lives smiles are a type of person-directed behavior, but languages are used not only as person-directed behavior, but also as a medium of thought. If vocalization is the origin of language, the results in Table 1 can be understood simply. In Study 3 observations of twins were prolonged to 24 months of age. In the second year of life vocalization with meaning appeared. So, we made a new observational index "Verbalization", which was distinct from Vocalization without meaning. We are analyzing these results and their relation to the origins of language now.

2. Socialization curve

In Studies 1 and 2 two infants' first appearances of social behavior were compared. First in Figure 1, the vertical axis shows the first appearances of A.N.'s behavior in terms of weeks of age, and the horizontal axis shows the first appearances of M.S.'s behavior in terms of weeks of age. Soc.S. means Social Smile; Soc.Voc., Social Vocalization; Soc.Pre., Social Prehension; Soc.Cre., Social Creeping, and Imi., Imitation. If all the marks were to be joined by a curved line, it would be called a *Socialization curve*. All of the marks coming under the 45° line indicate that the development of

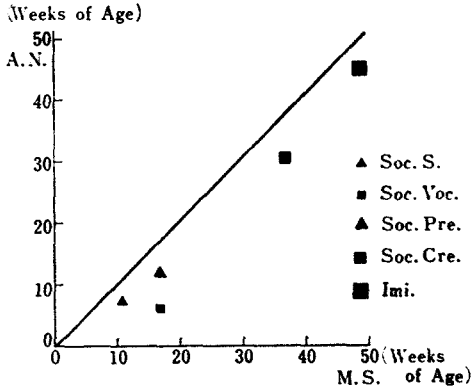

Figure 1 Socialization Curve I

M.S. in all behavior phases was later than that of A.N.

Figure 2 shows a comparison of the first appearances of social behavior of T.M. and the two institutionalized infants. The horizontal axis of the figure shows the first appearances of T.M.'s behavior in terms of weeks of age, and the vertical axis shows those of A.N. (represented by solid marks in the figure) or M.S. (represented by blank marks in the figure). Soc. Negaeri means rolling over towards a person and Cling means clinging to a person.

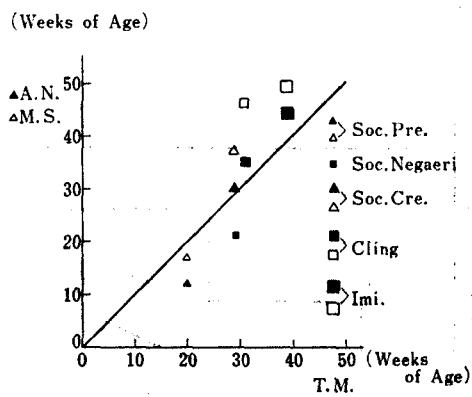

Figure 2 Socialization Curve II

From Figure 2 we find 30 weeks of age to be a critical point in

development. After 30 weeks of age the development of a home-reared infant overtakes and surpasses the development of institutionalized infants. *The second turning point is thus 8 months of age!*

Now, we have found two turning points in the social development of infants, in the third and eighth months of life. Figure 3 shows the author's hypothesis of social development during the first year of life. From the beginning the infant has social abilities, and at 3 and 8 months of age these abilities increase dramatically. These two initial points were pointed out once by Spitz, R.A. (1965),

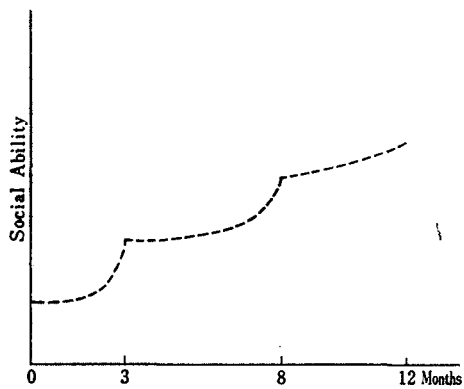

Figure 3 Development of Social Ability I
(The author's hypothesis)

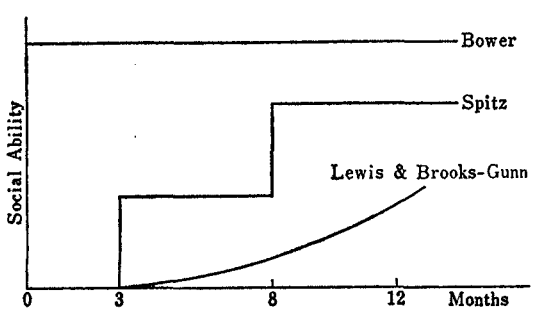

Figure 4 Development of Social Ability II
(Others' hypotheses)

but in his hypothesis the first phases of development were different from the author's (cf. Figure 4). Bower (1977) claims that infants have social abilities from the beginning, so the pursuit of processes of socialization is a waste. The author diagrams Bower's hypothesis in Figure 4. Lewis & Brooks-Gunn (1979) present the hypothesis of the development of self, based on their interesting experiments. The author diagrams their main hypothesis in Figure 4.[3)]

More studies are necessary to determine which hypothesis is most adequate for the development of social behavior in infancy.

3. Factors which bring about differences in development

In Study 1 A.N. and M.S. were brought up in the same institution. A.N., however, was more active and more curious than M.S., and A.N. was touched more often by caretakers than M.S., as can be seen in Figure 5.

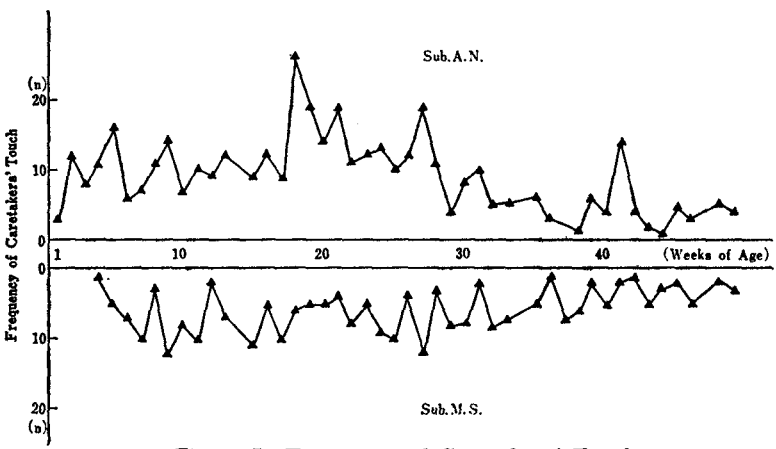

Figure 5 Frequency of Caretakers' Touch

In Study 2 T.M., a home-reared infant, was touched more often than an institutionalized infant, and T.M. received more vocalization than A.N., as can be seen in Figure 6. This might be one of the factors that caused the inversion of development at 30 weeks of age. The development of the infant is thus formed by reciprocity between infants and caretakers.

In Study 3 two main points are found. First, from the com-

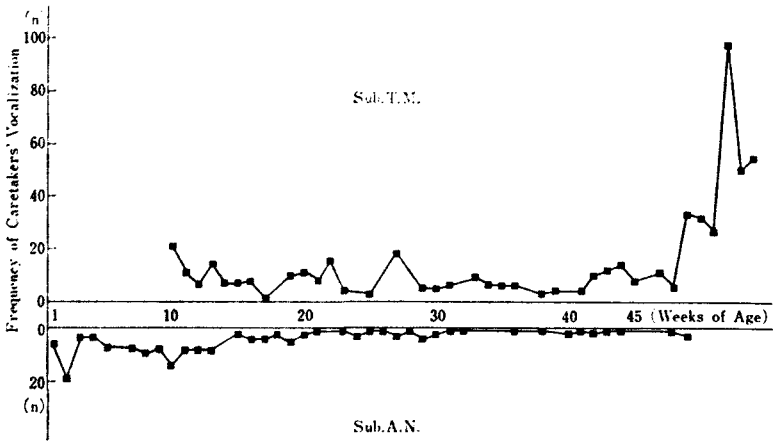

Figure 6 Frequency of Caretakers' Vocalization

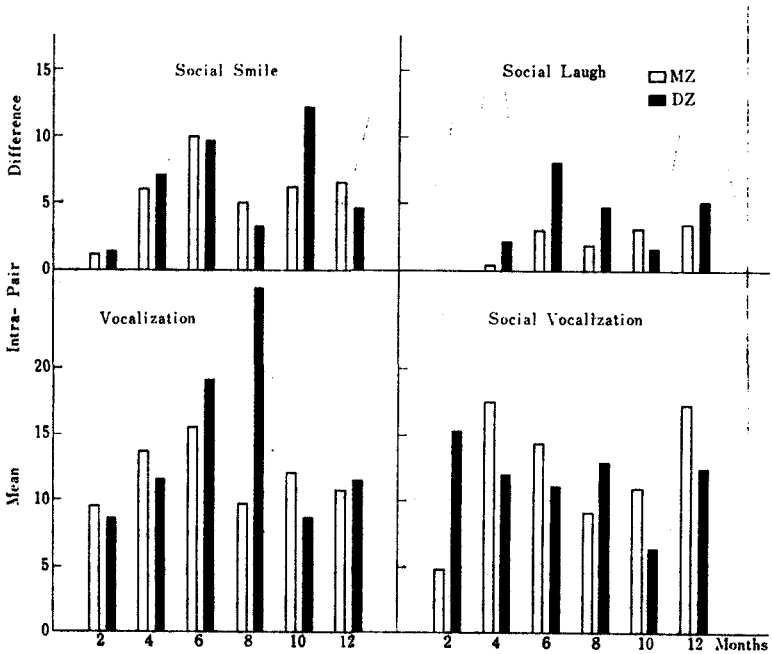

Figure 7 Mean Intra-Pair Difference

parison of mean intra-pair differences between MZ and DZ we find the results shown in Figure 7. Mean intra-pair difference is

Table 2 Correlation Coefficients

	Months	B.W.	APGS	Hospital
SS	2	0.1575	0.2836	−0.3003
	4	0.3523	0.0312	−0.3077
	6	−0.2427	0.0088	0.2669
	8	−0.2463	−0.3721	0.1250
	10	−0.1665	0.0329	−0.0033
	12	−0.3399	0.0284	0.0857
SL	2	#	#	#
	4	0.4098	−0.0298	−0.1332
	6	−0.0786	0.2296	0.1830
	8	0.2427	−0.0159	−0.1379
	10	−0.2331	0.1418	0.3031
	12	0.2173	−0.2619	−0.2197
V	2	0.3319	−0.1073	−0.2069
	4	0.1786	−0.0104	−0.2471
	6	−0.0738	0.3178	0.3582
	8	0.0472	0.0002	−0.0987
	10	−0.0889	−0.2882	0.0305
	12	−0.1329	0.1863	0.0575
SV	2	0.1143	0.0763	−0.2705
	4	0.2965	0.2409	−0.3723
	6	0.0523	−0.1086	−0.0830
	8	0.1744	−0.3714	−0.1744
	10	−0.2684	−0.0340	0.0867
	12	0.0220	−0.0060	−0.1397

B.W.: Birth weight
APGS: Apgar score
Hospital: Days of hospitalization
SS: Social Smile
SL: Social Laugh
V: Vocalization
SV: Social Vocalization
#: Did not appear

calculated using the following formula:

$$\text{MID} = \frac{1}{\text{Number of pairs}} \Sigma \left| \begin{array}{l}\text{Frequency in first born} - \\ \text{that in second born infant}\end{array} \right|$$

Figure 7 demonstrates the mean intra-pair difference with respect to Social Smile, Social Laugh, Vocalization and Social Vocalization. We cannot find any innate differences in the development of social behavior in infancy (except for Social Laugh).

Second, Table 2 represents the correlation coefficients between perinatal factors (birth weight, Apgar score and days of hospitalization) and infant behavior (Social Smile, Social Laugh, Vocalization and Social Vocalization). We note that generally correlations are higher in the period before 4 months of age. We think perinatal factors influence the development of social behavior only in the first few months of life.

From these studies we think the relationships between infants and caretakers play an important role in the development of social behavior in infancy. The mechanism of these interactions itself must, however, be carefully analyzed, and we are therefore presently studying the development of social interaction in infancy.

Footnote

1) The main points of this paper were presented at the 22nd International Congress of Psychology in Leipzig, East Germany, July, 1980.
2) The author thanks the Japanese Psychological Association and Dr. Hiroshi Azuma, who sent him to the Congress as a YOUNG PSYCHOLOGIST. The author also heartily thanks Mr. Bradley K. Kibbel, who is his English teacher, and many charming babies, who are his psychology teachers.
3) Lewis recognizes two important points in the first year, as does this author (personal communication), but experiments dealing with self recognition were done after 9 months of age.

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