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ABSTRACT

This study is an attempt to apply ethological tools of observation and analysis to the social behavior of 25 communally-reared children, ages 6 months to 4 years. The focus of this analysis is aggression and dominance relations. Findings indicate that: (1) agonistic behavior reveals stable and linear dominance hierarchies for children from 6 months to 4 years; (2) there is a higher frequency of agonistic behavior between children ranked in similar status categories; (3) there are no sex differences in aggression frequency or position in the dominance hierarchy; (4) children do not fight exclusively or significantly over space/territory or possession of objects; (5) there is a positive correlation between dominance rank and submission and a negative correlation between dominance rank and aggression; and (6) there is a positive correlation between dominance rank and age. (Author/CS)

AGGRESSION AND DOMINANCE RELATIONS IN YOUNG CHILDREN

Elizabeth Missakian and Karen Hamer

The origins of human behavior patterns have been popularized and at the same time poorly studied by biological and social scientists. The traditional argument has been that human behavior and motivation are somehow too complex to be systematically examined. Blurton Jones (1967) argues that such statements reflect a lack of talent or inexperience on the part of the observer and/or an overcomplication of variables relating to human behavior.

Although psychologists have devoted much attention to the question of human aggression (see Feshback, 1970 for review), only in the last few years has the possibility of studying human behavior in the same way ethologists study animals been seriously considered. The task is a difficult one. "To discern such more or less constant elements is particularly difficult in one's own species where familiarity suppresses curriosity, and where variety is more conspicuous than constancy" (Tinbergen, 1972, p. 471). This study is an attempt to apply ethological methods of analysis to human behavior. This paper is a report of aggression and dominance relations

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in peer groups of communally-reared children ranging in age from seven months to four years.

During the past ten years, there has been both popular and scientific interest in the phylogenetic origins of human aggression. Research on agonistic behavior and dominance relations has revealed the vital role of aggression in maintaining primate societies. Hall (1964) proposed that the dominance hierarchy functioned to control both inter- and intra-group aggression. Considerable primate research has focused on the definition or measurement of dominance. "Priority to incentives" has been a basic measure of dominance and a popular means of testing is the food test. However, results based on such tests correlate poorly with other measures of dominance (Warren and Maroney, 1958; Bernstein, 1969; Hall, 1968). A second measure of dominance has been the direction of agonistic encounters (i.e., the winner of an encounter). This second measure reveals different primate species are organized differently in terms of dominance relations. (See Bernstein, 1969 for a review of evidence for a number of different primate species.) Sade (1967) and Missakian (1972) have extended this definition and include only agonistic encounters in which an aggressive and a submissive gesture are observed. Such a definition reveals a linear hierarchy which correlates well with other measures of dominance. Studies employing the direction of agonistic encounters as the measure of dominance reveal a

higher frequency of interactions between animals adjacent on the matrix -- i.e., along the diagonal (Christopher, 1972; Plotnick, King, and Roberts, 1968). There is a higher frequency of aggression between those animals closer in rank than those further away. Kaufmann (1967) found no correlation between frequency of aggression and rank.

The concept of dominance involves analysis at a very different level from the description of individual motor acts or fixed-action patterns. Dominance is not observable, but is a higher order generalization extracted from behavioral data. Rowell (1974) has recently published an excellent paper on the concept of social dominance. She discusses and presents interesting data relating to functions commonly attributed to dominance: leadership, reduction of aggression, and reproductive success. On the basis of existing evidence, Rowell suggests looking at the submission hierarchy since it is correlated with rank while the agonistic hierarchy is not.

Research on human aggression has yielded somewhat different definitions of aggression. Hutt and McGrew (1967) refer to "agonistic behavior" which was later redefined by McGrew (1967) to consist of three components: aggressive behavior, fearful behavior, and defensive behavior. In relation to such definition, he cautions, "the detailed and objective descriptions of behavior patterns used by Homo sapiens is still largely tentative" (p. 149).

Bridges (1932, 1933) reported that aggression among institutionalized children appeared between 14-15 months of age and was immediately inhibited by adult social pressure. In a study of agonistic behavior among pre-school children, Blurton Jones (1967) reported that aggression occurred primarily over property. The concept of dominance, although applicable to older children, has not been considered useful in describing the power relations among children in this age group.

McGrew (1969) studied the agonistic behavior of pre-school children ages three to five years. The behavioral analysis focused on the consequences of particular behaviors which were recurring fixed-action patterns recorded during 240 agonistic and quasi-agonistic encounters. McGrew reported the existence of a dominance hierarchy which was correlated with the frequency of social interactions.

Grant (1969) listed nine components under the general heading "aggressive elements." These were: lips forward, small mouth, tight lips, intention bite, sneer, head forward, threat, chin out, wrinkle. An interesting point is to compare ethological definitions of aggression with those used by psychologists. While the former employ observable/behavioral terms, the latter tend to use more general, motivational terms. For example, Hartup (1974) defined aggressive acts as "intentional physical and verbal responses that are directed toward an object or another person and that have the capacity to damage or injure" (p. 339). Such terms as "intentional" and "capacity"

are difficult, if not impossible, to observe. In addition, the above definition omits those behaviors which function as signals (i.e., facial expressions, gestures, vocalizations) which do not in themselves have the potential to injure another child.

The many studies of aggression have employed varying terminology and criteria for definition of specific behaviors. In the future, there will hopefully be coordination of such efforts in order to yield a catalogue which is consistent in terms of terminology.

McGrew (1972) presented the most comprehensive catalogue of behavioral elements. He listed 100 motor elements, constant in form, which characterize children's behavior. His listing is not representative of the ethological approach despite the title of his book: An Ethological Study of Children's Behavior. According to Tinbergen (1972) such a title is misleading since ". . . ethology, even where it refrains from premature explanation, interpretation and speculation, is more exciting than these rather pedestrian results of conscientious counting" (p. 471).

An exciting ethological study of aggression among !Ko-Bushmen was completed by Eibl-Eibesfeldt (1974). Rather than simply delineate categories of aggressive behavior, he discusses general patterns of aggression. In this way, Eibl-Eibesfeldt is able to analyze both the form and function of aggression in an interesting and significant way.

The review of the literature on the ethological approach to the study of human behavior reveals a scarcity of research on the social behavior of children under the age of three years. However, delineation of several broad categories of behavior such as aggression and play into a finer analysis consisting of specific motor elements or components is an indication of the usefulness of the ethological approach to the study of our species.

Typical studies of child behavior involve children in a nursery school setting. In contrast, long-term peer associations among communally-reared children offer a unique opportunity to investigate patterns of social behavior and structure. Children raised in the Synanon community represented one of the largest single groupings of communally-reared children in the United States. This is a three year project. This paper is an analysis of the first five months of the research project -- the study of dominance relations and aggression. The period of study is from January-June, 1974.

METHODS

SYNANON FOUNDATION: HISTORICAL PERSPECTIVE

Beginning with approximately twenty individuals in 1958, Synanon Foundation has grown in 16 years into a community housing over 1,300 men, women, and children. (For a detailed description of the history of Synanon, see Endore, 1968: Yablonsky, 1965; and Simon, 1974). Synanon currently has facilities in Santa Monica, Badger, Oakland, San Francisco, and Marshall, California and in New York City. Originally conceived as a rehabilitation center for character-disordered individuals, Synanon has grown to become a natural experiment also involved in the reconfiguration of environmental space, community health practices and delivery systems, and the communal rearing of children.

SYNANON SCHOOL

The Synanon School began in July, 1965 with 13 children. The School is a 24 hour-a-day children's community where children live in peer groups from birth on. The School is part of the larger community of Synanon residents. Missakian and Mullen (1974) present a more detailed description of the philosophy and practice of the Synanon School.

At this time (December, 1974) there are 250 children living in the School. Their ages range from birth to 18 years. The two peer groups studied include children from 6-18 months (the infant program) and 18 months-4 years (the 2-4 program).

Both programs are located in a complex called the Synanon Lower School. There are Lower School facilities in Marshall and Santa Monica communities, however, only the Marshall School has been studied to date. The capacity of the Marshall Lower School is 27 children. The staff-child ratio in both the infant and 2-4 programs is one adult per four children.

SUBJECTS

During the period of study, the population in the two programs varied between 20-24 children. A total of 25 different children were observed between January-June, 1974. Of the 25 children, 14 were girls and 11 were boys. The age range in the infant program was 7.5-20.5 months, the mean was 15.27 months. The age range in the 2-4 program was 19.5-48.5 months, the mean was 35 months. (Ages were based on age as of June, 1974.)

BEHAVIOR CATEGORIES

There has been relatively little research on the social behavior of children ranging in age from birth to 2½ years. Therefore, there is no complete, pre-established or empirically-based behavioral catalogue or ethogram. In addition, peer groups of communally-reared children have been studied only minimally and seldom, if ever, employing an ethological approach. The vast majority of research on communally-reared children has focused on measurements related to developmental analysis for purposes of comparing such children with those reared in a family setting. Therefore, the initial observations were much like studying a new species.

The development of categories of behavior to record observations is critical. Several different levels may be used, ranging from description of activity in specific muscles to a broad general behavioral analysis. The selection of the appropriate level of analysis depends both on the purpose of the study and the degree of familiarity with the species under study. According to Marler (1967), if one is attempting to assemble an ethogram, then the behavior categories should be ". . . large enough to apply to an extensive study in a practical manner and yet sufficiently restricted to distinguish between functionally different forms of behavior" (p. 714). Such categories are empirically determined and serve as the basis for either finer or broader analysis.

Altmann (1962) described two different strategies employed in approaching a previously unstudied species. The first involves recording behavior categories which are pre-determined -- established prior to actual observation of the species. The second approach, favored by Altmann, consists of empirical determination of behavior categories -- allowing the behavioral units to be defined by the animals.

The authors recorded 492 hours of observation at the Synanon Lower School in Marshall, California. Records were maintained of aggressive and submissive behaviors. Dyadic interactions in which an aggressive behavior by one child was followed by a submissive gesture in the other were recorded as "fights"

and considered reliable indices of dominance relations. Dominance was reflected by the outcome of the interaction, not necessarily by the winner of an object or piece of property. An example, familiar to primate field researchers, is an encounter over a piece of food. One monkey may display several submissive gestures, yet retain the food while the other monkey may display aggressive behaviors and not get the food. In such a case, the animal losing the food but displaying aggression would be considered the winner of the fight. The criteria employed in this study is virtually identical to that used in studies of non-human primates (Sade, 1967; Missakian, 1972).

Table 1 is a listing of aggressive and submissive behaviors assembled during the five months of observations. This is not a comprehensive catalogue of such behaviors. Inter-observer reliability testing for each behavior category is currently underway.

Table 1. Behavioral categories of aggression and submission.

Aggression			Submission	
bat	lunge	repeated hit	avert head	let go
beat	mouth	roll on	beat head	moan
bite	near	rub	blink	pull back
bump	object bat	rush at	crawl away	run away
butt	object hit	scratch	cringe	scream
carry	open mouth	shake	short cry	screech
chase	pat	short chase	scream cry	squeal
crawl on	pinch	sit on	whine cry	squirm off
crowd	poke	slap	gasp cry	step back
displace	pull	spank	long cry	stomp
drag	pull at	squeeze	pant cry	walk away
drop on	pull down	step on	drop	whimper
dump	pull away	stretch face	fall	whine
fall on	pull hair	tackle	fall prone	help
grab	pull on	take	flinch	
hug	punch	taps	freeze	
jump on	push	throw at	get off	
kick	push down	trip over	give	
kick down	push off	tug	grimace	
lay on	push hit	vocalization	grunt	
lean on	raise arm	walk on	jump away	
lick	reach for	yell at	kick feet	

Observations focused on free-play situations in which there was a minimum of adult presence or interference. These situations were selected because there was more aggression during free-play than in adult oriented situations (i.e., workshops, toileting, feeding, field trips). There was very little aggression in adult oriented situations.

Double-observer reliability tests were performed on a total of 105 separate interactions. Agreement between observers regarding which child was aggressive and which was submissive was +.952. Agreement on whether the interaction involved an object or property was +.819. Each of the observers ranked the children in terms of dominance. Such rankings were based on dominance matrices. Spearman Rho Correlations were then calculated on these rankings. For infants 6-18 months of age, the correlation between the two observers was +.915. For children 18 months - 4 years, the correlation was +.986. Thus, at this general/gross level of behavioral analysis, there was high agreement between the two observers as to the individual rank of each child.

In addition to recording the aggressive and submissive behaviors in such dyadic interactions, records were also maintained of physical contact, the role of property in the interaction, and the location (indoors, outdoors) of the interaction.

OBSERVATION SCHEDULE

Observations were recorded daily over a period from 0630 - 1700 h. for five days per week. The daily activity schedule varied

both within and between the two programs studied, however, it generally consisted of periods of outdoor play, workshops, and rest in addition to routine care such as feeding, bathing and diapering.

RESULTS AND DISCUSSION

Contrary to the speculations of Ardrey (1967), there has been considerable research demonstrating that territoriality is not applicable to the behavior of most infra-human primates. Crook (1968) has questioned the assumptions and hypotheses of popularizations regarding the phylogenetic origins of human behavior. Although it has been clear that territory is not an appropriate concept, the question of what kind of social structure is applicable to human behavior has been open for study. Based on research of free-ranging primate societies, we hypothesized that dominance hierarchies would reflect the social structure of children.

A total of 3,528 individual agonistic interactions were recorded from January 14-May 31, 1974. Of this total, 1,390 occurred between children 6-18 months of age (referred to as the "infant program") and 1,983 between children 18 months-4 years (referred to as the "2-4 program"). The 155 remaining interactions were "mixed" in the sense that they involved children from two different programs.

We cannot draw any conclusions regarding relative levels of aggression since observations were not made of any children other than the Synanon population. However, comparison with Blurton Jones (1967) and McGrew (1969) reveals that the frequency of aggression among Synanon children was somewhat higher. Previous studies (Pulaski, 1974; Schwarz, Strickland, Krolick, 1974) have reported that infants raised in day care

were more aggressive, both verbally and physically, than home-reared infants. These studies employed trait ratings and testing techniques and are not comparable to observational studies. The question of whether communally-reared infants or infants raised in child care are more or less aggressive is still unanswered and awaits study on group and home-reared children, using identical assessment techniques.

Dominance matrices, based on observed interactions, were prepared for each program and appear in Matrix 1 and 2. Matrix linearity is the degree or percentage of interactions in a predictable direction. For example, with three individuals the relationship may be:

A dominant to B

B dominant to C

A dominant to C

In the above instance, the relationship between A, B, and C is 100% linear. Knowledge of the relationship between A and B enables prediction of the relationship between A and C. There are no reversals in the relationship between the individuals. In the following case, a triangular relationship is described:

A dominant to B

B dominant to C

C dominant to A

Knowledge of the relationship between A and B is insufficient to predict the relationship between A and C.

Knowledge of the degree of linearity in a matrix for a group of individuals enables prediction of outcomes for given dyads in the matrix. For example, a matrix with 90% linearity indicates that in 90% of cases, the outcomes of an agonistic encounter between any two individuals may be correctly predicted.

Linearity was determined by the following formula:

linearity = # of interactions to right of diagonal/
total # of interactions

Linearity for the dominance matrix of the infant program was 85.4% and 90.1% for the 2-4 program. In the infant program, 85.4% of the interactions were in a predictable direction while 14.6% represented reversals (i.e., lower ranking children dominant to higher ranking).

The most interesting finding was the existence of a linear dominance hierarchy among children ranging in age from 6 months to 4 years. This finding, while in agreement with many primate field studies, is in sharp contrast to previous studies of preschool nursery children. Children living in the Synanon School live together in a 24 hour-a-day situation. Their long-term contact with one another may be responsible for the formation of such stable social groupings. It is not surprising that children who spend only a few hours together daily, over relatively short spans of time, in constantly changing groups characteristic of nursery schools and day care centers do not

form stable dominance or power relations. The fact that children described in this study reflect very different patterns of social structure in terms of their agonistic behavior suggests that other aspects of their behavior (play, for example) may also be very different. In this sense, these children offer a rich source for study.

Table 2 contains the summary of statistical analyses on the data. The two programs are considered separately. In the following presentation of the results, each of the categories/ variables in Table 2 will be discussed.

Table 2. Summary of Chi Square analyses for variables of status, object involvement, and physical contact

Variable	Program	Chi Square	Significance
status	infant	107.12	.001
status	2-4	2040.42	.001
object involvement	infant	3.40	ns
object involvement	2-4	88.52	.001
physical contact	infant	1153.06	.001
physical contact	2-4	1332.77	.001

The variable "status" refers to relative status of participants in the interaction. Nine categories of status were delineated: high-high, high-mid, high-low, mid-high, mid-mid, mid-low, low-high, low-mid, low-low. The first category refers to those

interactions between two high ranking children. Rank categories were based on dominance Matrices 1 and 2 presented above. Ranks 1-4 were designated "high", 5-9 were "mid", and 10-13 were "low." Table 3 lists the frequency of interactions, per program, for each of the status categories.

Table 3. Interaction frequencies for nine status categories.

Status Category	Infant Program	2-4 Program
high-high	143	151
high-mid	431	266
high-low	139	159
mid-high	49	36
mid-mid	172	192
mid-low	300	773
low-high	3	1
low-mid	33	34
low-low	120	371

There was a significant difference between status categories for each program. Category 6, interactions between mid and low ranked children, contained the highest frequency while category 7, low and high ranking contained the least. The finding that there were fewer interactions between similar-ranked children when the data are grouped is in contrast to socialogical reports of status in small groups. However, upon inspection of both Matrix 1 and 2, it is clear that for individual pairs of children along the diagonal, there was a higher

frequency of agonistic interactions.

Records were maintained of the sex of the participants in individual interactions. There was no difference in aggression frequency between boys and girls in the infant program ($t=.39$; $df=10$; ns) or the 2-4 program ($t=.94$; $df=11$; ns). Boys and girls were represented in all dominance ranks. These findings are in sharp contrast to studies reviewed by Maccoby and Jacklin (1974). They conclude, on the basis of an extensive literature review, that there are clear sex differences in aggression frequency and rank within the dominance hierarchy. A detailed analysis of sex differences is presented in a separate paper (Missakian, 1974).

Previous research on pre-school children has concluded that most aggression occurs over property (toys, equipment, etc.) or space. The results of this study do not support such findings. Within the infant program, 729 agonistic interactions involved property while 661 did not. This difference was not statistically significant (see Table 2). Thus, property did not play a significant role in aggression of children 6-18 months of age. Within the 2-4 program, significantly more interactions did not involve property (1200 vs. 783). The "fights" involving these older children did not focus on property, thus priority to incentives was not a significant factor in their agonistic behavior. Contexts in which "non-property aggression" occurred were:

1. provocation, typically verbal or gestural;
2. terminating agonistic encounter of two other children;
3. play situations grading into aggression (typically play involving physical contact);
4. displaced aggression (following agonistic encounter with another child); and
5. retaliation

It is significant to point out that a large number of agonistic interactions occurred for no reason apparent or obvious to the observers. The points outlined above are similar to those reported by Eibl-Eibesfeldt (1974). Typical situations in which aggression among children of the !Ko-Bushmen occurred were: (1) quarreling about possession of objects; (2) punishment of offenses; (3) demonstrative aggression; (4) unprovoked spontaneous attacks; and (5) escalation of play.

Records were maintained of the use of physical contact in the interactions. Within the infant program, significantly more interactions involved physical contact between children (1,136 vs. 65). Within the 2-4 program, significantly more interactions involved physical contact (1,798 vs. 176). These numbers should be interpreted carefully since they tend to reflect the inexperience of the observers more than the behavior of the children. Non-physical interactions (vocalizations, facial expressions, gestures) are more difficult to observe, thus their occurrence is probably underestimated. A detailed analysis of finer levels of aggressive and submissive gestures is currently underway.

Spearman Rank Correlations were calculated on the following variables: dominance rank, age, aggression, and submission. The three youngest children in the infant program (all under 8 months of age) were considerably younger than the other infants in that program. They were involved in very few agonistic interactions and as can be seen in Matrix 1, their interactions were not clearly linear. As a result, the correlations were inflated for the infant program. By eliminating these three children from the analysis, the pattern of correlations was reversed.

This can be seen in the "infant program 2" section of Table 4. Both the magnitude and direction of the correlations was changed. Table 4 contains the Spearman Rank Correlations between variables of dominance rank, age, aggression, and submission for infant program 1, infant program 2, and the 2-4 program.

Table 4. Spearman Rank Correlations between variables of dominance rank, age, aggression, and submission for infant program 1, infant program 2, and the 2-4 program.

Variables	Infant Program 1	Infant Program 2	2-4 program
rank/age	+.96 *	+.91 *	+.82 *
rank/aggression	+.76 *	+.48	+.16
rank/submission	+.12	-.76 *	-.85 *
age/aggression	+.73 *	+.43	+.09
age/submission	+.18	-.58	-.71 *
submission/aggression	+.41	-.08	+.10

There was a positive correlation between dominance rank and submission and a negative correlation between rank and aggression. These correlations are virtually identical to correlation patterns reported for non-human primates (Rowell, 1974). There was a significant positive correlation between dominance rank and age. It should be pointed out, however, that this was not a perfect correlation and that younger children could and were dominant to older children.

SUMMARY

This study is an attempt to apply ethological tools of observation and analysis to the social behavior of children ranging in age from 6 months to 4 years. The focus of this analysis is aggression and dominance relations. The findings may be summarized as follows: (1) agonistic behavior reveals stable and linear dominance hierarchies for children from 6 months to 4 years; (2) there is a higher frequency of agonistic behavior between similar-ranked children; (3) there are no sex differences in aggression frequency or position in the dominance hierarchy; (4) children do not fight exclusively or significantly over space/territory or possession of objects; (5) there is a positive correlation between dominance rank and submission and a negative correlation between dominance rank and aggression; and (6) there is a positive correlation between dominance rank and age.

Generally, the findings indicated that ethological tools could be applied successfully to the study of human behavior. The results of such endeavors revealed findings often very similar to research reports of free-living primates. Methods of observation, behavioral categories, criteria for dominance relations, and results of dominance matrices were similar.

Matrix 1. Dominance matrix of aggression/submission for children in the infant program (6-18 months).

Aggression \ Subordinate	Ma	Ka	Aa	At	Jo	Si	An	Jf	Lh	Is	Ca	Mx	Al	Totals
Ma		64	34	31	8	45	13	1	4	4	0	0	0	204
Ka	17		24	12	7	14	1	4	10	2	0	0	0	91
Aa	3	2		5	80	144	59	36	43	27	9	6	0	414
At			6		3	12	9	4	3	2	9	9	9	39
Jo		1	30	2		32	41	37	55	35	6	4	0	243
Si			10	5	21		26	33	24	21	3	0	0	143
Ar	1		5	1	8	12		23	15	30	2	1	0	98
Jf					4	1	7		11	15	2	1	9	41
Lh			2		2	7	7	11		17	4	1	9	51
Is			1			1	5	12	13		11	2	0	45
Ca							1	1				9	3	14
Mx											4		3	7
Al														
Totals	21	67	112	56	133	268	169	162	178	153	41	24	6	1390

Matrix 2. Dominance matrix of aggression/submission for children in the 2-4 program (18-48 months).

		Subordinate													
		Da	Mo	Le	St	Re	La	Er	Na	Ar	Be	Jd	Dl	Ma	Totals
Aggressor	Da		21	19	46	10	22	5	17	29	1	14	4	11	199
	Mo	3		12	11	9	11	4	13	5	4	5	8	6	91
	Le				9	5	27	4	10	26	3	9	15	14	122
	St	15	6	5		8	25	6	17	34	6	21	21	5	169
	Re	2	4	1	4		10	10	11	11	0	20	12	4	89
	La	3	1	6	3	1		8	10	28	4	54	29	13	160
	Er		2	5		2	1		29	13	1	6	28	4	91
	Na		1	1		1	6	5		51	5	34	34	11	149
	Ar	1		1	1		1	4	6		37	135	200	194	579
	Be							1		8		47	25	12	93
	Jd	1				1	3		1	23	5		55	33	122
	Dl				1		2		2	9	16			52	82
	Ma	1				2	2	2	4	2		2	21		36
	Totals	26	35	50	75	39	110	49	120	239	66	363	451	359	1983

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