

## 5. RESULTS

### 5.1. Correspondence between the descriptive model of aggression and interindividual differences in behaviour

#### 5.1.1. *The descriptive model of aggression*

Together with the construction of the descriptive model of aggression (pp. 27—29) it was assumed that an observer can find out the intensity, direction and aim of aggressive responses on the basis of a succession of events. It was predicted that they would account for the main proportion of the variance of interindividual differences in aggression.

The hypothesis was studied by factor analysing the intercorrelations of the aggression variables. As the descriptive model being tested was three-dimensional an examination was first made into how the common variance of the variables can be described in terms of the first three factors. According to Harman (1967, 100) a principal-factor pattern, without unique factors, may be exhibited as follows:

$$\begin{aligned} z_1 &= a_{11}F_1 + a_{12}F_2 + a_{13}F_3 + \dots + a_{1m}F_m \\ &\vdots \\ z_n &= a_{n1}F_1 + a_{n2}F_2 + a_{n3}F_3 + \dots + a_{nm}F_m, \end{aligned}$$

where each of the  $n$  observed variables ( $j=1, 2, \dots, n$ ) is described in terms of  $m$  common factors ( $F$ ). Each successive common factor contributes a decreasing amount to the total, original communality. Although the first three common factors do not account for all of the total communality and the correlations among the variables, they account, however, for a considerable proportion of it, which is also likely to be interpretationally the most important.

The first three principal factors accounted for the total communality 84.6 %. They explained the common variance as predicted.<sup>1</sup> Factor I was unipolar, the next two bipolar. *Factor II* was spanned by *direct vs. indirect* aggression, *Factor III* by *defensive vs. offensive* aggression. The correlation between the loadings of the variables on Factor I and the communalities (after seven factors) was 0.84. Factor I was interpretable as a general aggression factor. Interindividual differences in the frequencies of aggression are probably most reliably discovered for responses that are in one way or another essential from the point of view of the group of raters (e.g. to the work of kindergarten teachers). The correlation between the loadings on Factor I and the condemnability<sup>2</sup> of the responses described by the aggression variables was 0.66. Condemnability and the intensity or observability of aggression are likely to correspond to each other, on the basis of which *the first principal factor* was interpreted as representing the vertical dimension called *intensity*<sup>3</sup> in the descriptive model of aggression.

Fig. 2. illustrates the three-dimensional structure of the aggression variables. The location of the variables was determined by the loadings on the first three principal factors.

The figure corresponded very well to the descriptive model of aggression hypothesized. All the variables were bound together by the general aggression factor, i.e. by the positive loadings on the first principal factor. Variables 9 and 5 (Appendix A. 1; mimicked resentment and verbal resistance, e.g., go away) had the lowest loadings, while variables 24 and 30 for offensive aggression had the highest loadings. Projections drawn on a plane illustrate the loadings of the variables on the second (direct/indirect) and the third (defensive/

<sup>1</sup> The factor matrix is obtainable mimeographed, see footnote, p. 202.

<sup>2</sup> When the material was being gathered for the study, 10 kindergarten teachers not included in the final sample of raters were drawn at random from the population of raters. They were asked to judge the condemnability of the responses described by the aggression variables on the 6-point scale (not condemnable at all — extremely condemnable).

<sup>3</sup> In order to find out whether the emergence of the dimension of intensity was influenced by the raters' working experience in a kindergarten, an additional factor analysis was performed of the battery, involving both the aggression variables and a variable for the time that had passed since the teachers' graduation. The latter did not load on the first principal factor. It had the highest loading (0.29) on the third factor, which indicated that more offensive aggression had occurred or had been rated as occurring in young teachers' groups than in those of older teachers.

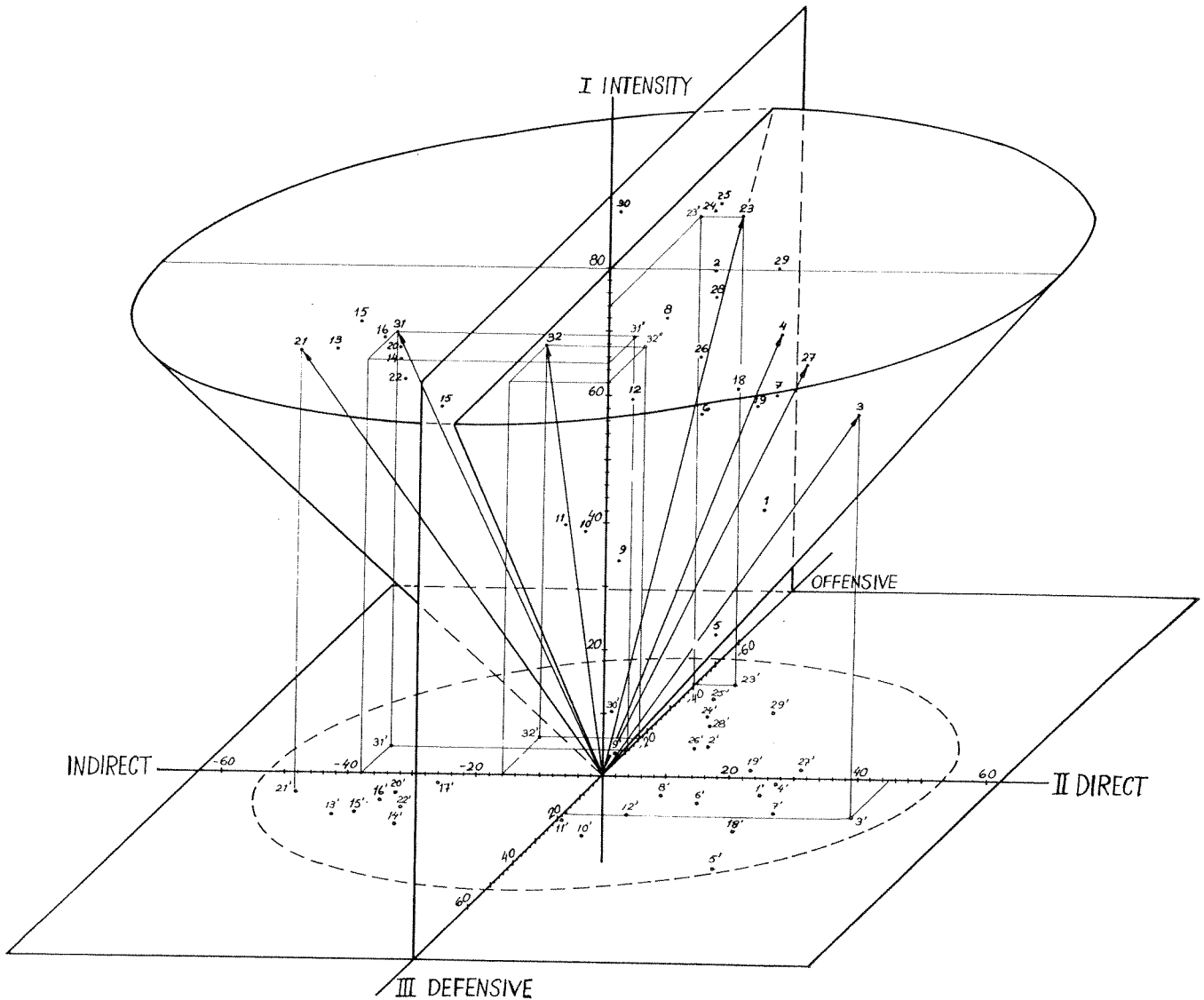


Figure 2. The three-dimensional structure of the aggression variables, the first three principal factors.

offensive) principal factor. There were only a few differences in the main dimensions between the hypothesized characteristics of the responses included in the list of variables, and the empirical structure of the variables. The most remarkable exception concerned variable 18: the variance for sneaking was explained more by direct than indirect aggression.

### 5. 1. 2. *Direction and aim of aggression*

It was predicted in **Hypothesis A. 1** (p. 43) that the direction and aim of aggression would account for a larger proportion of the variance of interindividual differences in aggression than the mode of aggression. The result supported the hypothesis. No factors emerged for the mode of aggression interpretable as independent of the aim of aggression. Direct defensive aggression was differentiated, however, according to the modes of aggression, after further factors had been extracted.

The varimax rotation of the first three principal factors yielded the followings factors.<sup>1</sup>

*Factor I:* Defensive aggression, directed toward the instigator, involving all modes of aggression, mainly direct, independent of offensive aggression (cf. Factor III). The per cent of the common variance explained by Factor I was 28.4.

*Factor II:* Indirect aggression involving both the defensive and offensive aim. The per cent of the common variance was 37.5.

*Factor III:* Offensive aggression together with intense defensive aggression involving different modes of aggression. The per cent of the common variance was 34.1.

The varimax rotations were also performed with 4—8 factors. The first seven eigenvalues accounted for just about (98 %) the total original (estimated) communality.<sup>2</sup> The loadings on the eight factor were low, and the factor was not interpretable. The interpretation was based on the seven-factor rotation carried out both by the varimax method and by the method of analytic cosine rotation.

Compared with the three-factor rotation, an increase in the number of rotated factors was not found to alter the interpretation of the factor for offensive aggression. In the six-factor rotation a relatively small proportion of the variance of indirect aggression was explained

<sup>1</sup> The rotated factor matrix is obtainable mimeographed.

<sup>2</sup> There were many criteria available for selecting the number of factors to be rotated, but the numbers obtained by different methods varied remarkably. The Guilford & Lacey method yielded seven factors, and Burt's only four (Thomson, 1956, 122—123). Comparison of the product of eigenvalues with unity yielded nine factors, and if the criterion that only factors explaining at least 2 % of the total variance should be rotated had been followed, five factors should have been interpreted. In the present investigation the number of interpretable common factors was determined by employing Harman's criterion (1967, 169): the ratio of eigenvalues to the original (estimated) communality should be about 1.00.

by the other factor, whereas direct defensive aggression was divided into four factors. The one first detached from the general defensive aggression factor, found in the four-factor rotation, was identified as mimic aggression. The second specific factor, interpreted as the halo factor, was obtained in the five-factor rotation, and the third one, interpreted as verbal defensive aggression, in the seven-factor rotation. After these processes the original defensive aggression factor could be described in terms of physical defensive aggression.

The factors obtained in the seven-factor rotations<sup>1</sup> were interpreted<sup>2</sup> as follows:

### 1. Offensive aggression

The highest loadings were found in the variables for both direct and indirect physical offensive aggression. This cluster of responses also comprised physical defence. Variable 2 (behave defiantly) had more in common with the variables for offensive than with those for defensive aggression, and contrary to assumption, its location in Fig. 2 also fell on the quadrant of direct offensive aggression. In spite of the high loadings of the variables for the physical mode of aggression, this factor could not be interpreted on the basis of the mode of aggression, since the variables for both direct and indirect verbal offence also had high loadings. Of defensive verbal aggression sneaking and making scornful remarks were characteristic of boys who behave offensively. The positive relation of sneaking to offensive aggression may have been a consequence of frequent complaining of (physical) pain due to frequent or severe conflicts and fights, or of attention-getting, which has been assumed to be one of the central motives of offensive aggression.

The factors yielded by the varimax rotation and that by the analytic cosine rotation were very much alike.

The teachers' ratings concerning the targets of aggressive responses rendered it possible to examine how the form of aggression described by each factor was directed toward different targets. The means of the raw scores combined in factors<sup>3</sup> indicated that offensive aggression (means obtained from variables 23—32) has most often been directed toward boys of the same size. The subsequent places are held by smaller boys and girls. Taller boys and teachers have been attacked less frequently.

### 2. Indirect aggression (a)

The factor was spanned mainly by aggression toward objects in the environment through displacement, spread or projection of aggression, but the cor-

<sup>1</sup> The rotated factor matrices (varimax rotation and analytic cosine rotation) are obtainable mimeographed.

<sup>2</sup> The variables with a loading of less than 0.30 are not taken into account in the interpretation of the factors.

<sup>3</sup> The table is obtainable mimeographed.

responding responses toward other persons also had loadings of approximately the same size. In addition to the variables mentioned above, swearing suggested the presence of anger and diffuse response in a thwarting stimulus situation. Besides indirect defensive aggression, this factor explained a proportion of the variance of indirect offensive aggression. The factor yielded by the analytic cosine rotation was narrower than that yielded by the varimax rotation: the former did not cover indirect offensive aggression.

The means of the rating scores for the targets of indirect aggression (variables 13—17 and 21—22) indicated that taller boys and teachers had caused more stimulus generalization than smaller boys or girls, while the latter had been vicarious targets more often than teachers or taller boys. The result was consistent with the displacement model of inhibited aggression.

### 3. Indirect aggression (b)

The factor had quite a narrow scope. The highest loadings were found in two variables of the same kind (20 and 31), for which dissimilar aims had been defined. The aggression variables included additional response pairs of a corresponding kind, but in these the mates divided into separate factors. Indirect aggression, in terms of which this factor and the variables spanning it could be described, was characterized by imposition on another person's tendency to take care of both human beings and objects. Direct aggressive responses remained threats. The factors yielded by the orthogonal and oblique rotations corresponded to each other.

Girls and smaller boys were relatively often targets of this kind of indirect aggression (variables 20 and 31). The highest mean was, however, that for boys of the same size, as in other factors.

### 4. Physical defensive aggression

With the exception of variable 3, the largest proportion of the variance of which was explained by the seventh factor, the variables for direct, defensive physical aggression had significant loadings on this factor. In addition, verbal and mimic threat as well as verbal opposition were loaded on this factor. The factor represented aggression whose purpose was to repel a thwarting stimulus immediately.

There were some differences between the factors yielded by the varimax and analytic cosine rotations, but they did not have any influence upon the general interpretation of the fourth factor.

The means of the rating scores for the targets (variables 1, 4, 6, 12) indicated that physical defence was used mainly against boys of the same size, but also against other peers, especially smaller boys.

### 5. Verbal defensive aggression

Compared with the fourth factor, this factor could be interpreted correspondingly as verbal defence. Yet it was coloured more affectively than the factor of physical defence, in which repulsion of thwart was emphasized. A comparison of factors 4 and 5 gave rise to the assumption that if a child is capable of re-

elling a thwarting stimulus in the most primary and direct way, emotional reaction instigated by the situation does not manifest itself as generalized negative attitudes such as making scornful remarks on somebody else's personality.

The only differences between the factors yielded by the orthogonal and oblique rotations were in the variable for crying.

The means of the rating scores for the targets (variables 5, 7, 8, 19) indicated that verbal defensive aggression was frequent if the instigator was a taller boy.

#### 6. Mimic aggression

Of the variables for direct mimic aggression resentment and sulk had the highest loadings on this factor, but two variables for verbal offensive aggression were also loaded on it according to both the orthogonal and oblique rotation.

For the interpretation of the factor an inspection was made of the distributions of the rating scores for each target in variables for mimic aggression (9 and 10) and verbal offensive aggression (26 and 28) in a random sample of 100 subjects.

Variables	Teacher + taller boy	Boy of the same size	Girl + smaller boy
9+10	243	150	122
26+28	106	174	222

The difference between the frequency distributions was tested by Chi square, and it was found very significant ( $p < .001$ ). The factor could be interpreted as representing some kind of displacement of restrained aggression, but it had burst out against smaller peers in the form of verbal offensive aggression.

#### 7. Halo factor

The factor was spanned by variables for different forms of aggression. Variables 3, 18, 5 and 10 had, however, one thing in common: they were all first variables on the rating form, and variable 27 was the first variable after the three rating variables added for the purpose of reducing the response sets. The correlation between the order of size of the loadings and the order of rating of the variables was 0.62. The factor was interpreted as being spanned by a negative halo effect, whose influence upon rating was great at the beginning but weakened as rating required continuous discrimination in behaviour of a negative nature. The interpretation of the halo factor is supported by results concerning the relations of factor scores for the aggression factor to those for background factors (p. 67) and to global ratings of aggressiveness (p. 70).

#### 5. 1. 3. *Mode of aggression*

It was predicted in Hypothesis A. 2 that the mode of aggression may account for the variance of interindividual differences in aggression in a further analysis of the main forms of aggression. The variables for direct (1—12 and 23—28), indirect (1—13 and 29—32), de-

defensive (1—22), and offensive (items 23—32) aggression were factor analysed separately.<sup>1</sup> These analyses, with the exception of that for indirect aggression, yielded factors interpretable on the basis of the modes of aggression. The factors, especially those for defensive aggression, can, however, be interpreted also on the basis of the intensity of aggression.

#### Direct aggression: 5 factors

The structure corresponded to the primary factor composition, with the exception of the indirect aggression factor, the variables of which were excluded. Consequently, no factors interpretable on the basis of the modes of aggression and involving both the defensive and offensive aim could be found. Expected factors for the modes of aggression emerged only for defensive aggression.

#### Indirect aggression; 3 factors

No factors emerged for the modes of aggression. Two factors were interpretable on the basis of the aim of aggression. The third factor corresponded to the indirect aggression factor (b) of the primary factor composition.

#### Defensive aggression; 5 factors

No factors were found as obviously interpretable on the basis of the modes of aggression as those emerging for defensive aggression when the variables for offensive aggression were included in the factor analyses (both for the primary factors and for direct aggression); the factors spanned by direct defensive aggression could be described in terms of the intensity of aggression.

*Factor I:* Indirect defensive aggression.

*Factor II:* Intensive direct defensive aggression. The highest loadings on this factor were found in variables for defensive aggression that were loaded on the offensive aggression factor in the primary factor composition. The highest loadings were found for sneaking, scornful remarks, fighting, and defiant gestures and expressions.

*Factor III:* Mimic aggression together with verbal resistance (5).

*Factor IV:* Physical resistance together with verbal opposition (6).

*Factor V:* Halo factor.

The variables for verbal aggression divided into three factors, which differed according to the intensity (condemnability) of aggression. The variables for physical and mimic aggression divided into two factors respectively.

#### Offensive aggression; 3 factors

The common variance of offensive aggression proved to be very strong in the primary factor composition. The separate analysis yielded, however, factors interpretable on the basis of both the direction and mode of offensive aggression.

<sup>1</sup> The rotated factor matrices are obtainable mimeographed.



*Factor I:* A general offensive aggression factor. The highest loadings were found in the variables for direct and indirect *physical* offence. In addition, verbal teasing and scorn were loaded on this factor.

*Factor II:* Indirect offensive aggression. Direct physical and verbal offence aimed at disturbing others were also slightly loaded on this factor.

*Factor III:* Both direct and indirect verbal offensive aggression. In addition, the variable of physical hurting loaded significantly.

If different forms of aggressive behaviour were widely represented in the variables, the factor analysis revealed that the most essential dimensions describing interindividual differences were: (1) Some boys not only defend themselves by responding vigorously, but also bring about similar situations for other persons in many ways. (2) Some children are characterized by displacement of aggression and indirect revenge, which is a possible consequence of the fact that these children are afraid or incapable of meeting thwarting stimulus situations by means of direct action. (3) In some children aggression is limited to thwarting stimulus situations. Their aggressive behaviour takes different forms, probably determined by the instigator: (a) an individual may try to eliminate the stimulus immediately, mainly physically; (b) he may protest against the progress of events verbally, in which case his response suggests the presence of suppressed affects; or (c) he may restrain himself from active resistance and content himself with showing displeasure by his appearance, in which case his activity may, however, burst out as attacks against other persons in some other situations.

The modes of aggression are probably connected with inhibition of behaviour in a thwarting stimulus situation. No factors interpretable on the basis of the modes of aggression, involving both the defensive and offensive aim, could be found.

#### 5. 1. 4. *Second order factors*

It was predicted in Hypothesis A. 3 that different aggressive habits intercorrelate positively and combine in the second order factor structure into a general overt aggression factor. The intercorrelations of the aggression variables were positive, varying  $+ .08$  —  $+ .76$ . The size of the intercorrelations of the factors (seven primary factors) depended on the operations by which they had been obtained:

- a) The intercorrelations of factor scores were not significantly different from zero.
- b) The intercorrelations of scale scores were positive, varying  $+ .33$  —  $+ .70$ . The scale scores were compounded as follows. The variables were grouped

on the basis of the size of the loadings in both rotation solutions to represent the factors. (1) Offensive aggression: items 23—26, 28—30, 32, 2; (2) Indirect aggression (a): 13—17, 21—22; (3) Indirect aggression (b): 20, 31; (4) Physical defensive aggression: 1.4, 12; (5) Verbal defensive aggression: 5, 7—8, 19; (6) Mimic aggression: 9, 10; (7) Halo factor: 3, 16, 27. The scale scores (sums of unweighted scores) were calculated for each subject from normalized rating scores.<sup>1</sup>

c) The intercorrelations of the factors, obtained in the analytic cosine rotation (Vahervuo & Ahmavaara, 1958, 129), corresponded to the intercorrelations of the scale scores, varying 0.22—0.79.

The second order factors were extracted by factor analysing the correlation matrices (b) and (c). The proportion of the sum of estimated communalities explained by the first factor was 86.1 % and 76.3 % respectively. The first two eigenvalues accounted for the total communality 96.8 % and 92.3 % (the first three, 101.2 % and 102.4 %). The first factor had a very large scope, which supported the hypothesis on a general overt aggression factor. Both factor analyses considered, the highest loading on the first second order principal factor, (range  $+ .86 - + .51$ ) was found in the offensive aggression factor, and the next highest in the indirect aggression factor (a) and (b), the halo factor, the factors of physical defensive aggression, and verbal defensive aggression, while the lowest loading was found in the mimic aggression factor. This order was consistent with the loadings of the variables on the first principal factor for the primary factor composition, which had been interpreted as representing the dimension of intensity in the descriptive model of aggression (Fig. 2, p. 54).

The first factor did not, however, explain all of the estimated common variance. The rotated factor matrices are given in Table 1. The interpretation was based on the two-factor rotation:

Factor I: Direct defensive and offensive aggression

Factor II: Indirect defensive and offensive aggression

When both of the second order structures were taken into account the highest loadings on *Factor I* were found in the factors of physical and verbal defensive aggression (the highest loading on the first factor for the scale scores was in the halo factor, which, for the structure based on cosine solution, stood in the middle of the cluster of direct and indirect aggression). The primary factor of offensive aggression contained both direct and indirect aggression, which was a possible reason for the fact that its variance was explained by both of the second order factors.

<sup>1</sup> The validity coefficients of the scale scores (estimated factor scores) (Vahervuo, 1956, 108) on the rotated factors obtained by the varimax method were as follows. F.I: 0.78; F.II: 0.86; F.III 0.54; F.IV: 0.60; F.V: 0.65; F.VI: 0.63; F.VII: 0.74.

Table 1. Rotated factor matrices, second order factors

Primary factors	Structure of scale scores			Structure based on cosine solution		
	I	II	$h^2$	I	II	$h^2$
1. Offensive aggression	60	62	74	42	64	59
2. Indirect aggression (a)	39	74	70	17	87	79
3. Indirect aggression (b)	20	82	71	28	83	77
4. Physical defensive aggression	74	35	67	70	31	59
5. Verbal defensive aggression	74	37	68	75	08	59
6. Mimic aggression	30	44	28	51	37	40
7. Halo factor	79	29	71	59	45	55

The highest loadings on *Factor II* were found in both indirect aggression factors. Factor II also accounted, to some extent, for the variance of the mimic aggression factor, which had been interpreted as reflecting some kind of displacement of aggression, i.e. stimulus generalization, which also took place in indirect aggression (a).

In spite of the differences in the operations by which the intercorrelations had been obtained, the structures of the second order factors corresponded rather well. They showed that the cluster of variables bound together by the general aggression factor could be described in terms of two orthogonal axes. They could be named on the basis of the direction of aggression, one of the two cross-sectional dimensions in the descriptive model of aggression.

## 5.2. Dependences of aggressive habits on personality and social background variables

It was predicted in Hypothesis B. 1 that background variables describing an individual's ability to defend himself within his social group correlate with direct and indirect aggression. The second order factors showed that direct aggression was most clearly represented in the primary factors of physical and verbal defensive aggression, and indirect aggression in those of indirect aggression (the variance of offensive and mimic aggression as well as that of the halo factor was explained by both of the second order factors).

In the examination of the hypothesis the dependent variables consisted of the factor scores for the seven primary factors of aggression.

The independent variables, defined exactly in Appendix A. 1, are given in Table 2.

Table 2. Correlation coefficients between background variables and factor scores for the aggression factors

Background variables	Direct defensive		Halo factor 7	Off. aggr. 1	Mimic aggr. 6	Indirect aggression		Differences direct/ indirect
	Phys. 4	Verb. 5				(a) 2	(b) 3	
Age	-.10	-.07	.03	-.11	-.18**	-.22**	-.09	n.s.
Stature	.03	-.01	-.02	-.02	.10	-.16**	.12*	4-2 <sup>1</sup>
Intellectual development	.08	.06	-.09	-.14*	-.09	-.07	-.05	n.s.
Verbal development	.10	.14*	-.08	-.04	-.07	-.06	.00	4-2 <sup>1</sup> , 5-2 <sup>1</sup>
Active (vs. passive)	.14*	.12*	.36**	.18**	-.12*	-.01	-.13*	4-3 <sup>2</sup> , 5-3 <sup>2</sup>
Leader (vs. withdrawing)	.06	.23**	.35**	.22**	-.07	-.01	-.19**	4-3 <sup>2</sup> , 5-2 <sup>2</sup> , 5-3 <sup>2</sup>
Popular (vs. despised)	.11	.03	-.09	-.07	-.05	-.10	-.10	4-2 <sup>1</sup> , 4-3 <sup>1</sup>
Number of children in family	.00	-.05	-.06	.01	-.16**	-.02	-.11	n.s.

\* Significant at .05 level, if  $r \geq .12$

\*\* Significant at .01 level, if  $r \geq .16$ , for a one-tailed test.

The significance of the difference (d): <sup>1</sup>  $p < .05$ , if  $d \geq 0.16$ , <sup>2</sup>  $p < .01$ , if  $d \geq 0.23$ , for a one-tailed test and for this range of size of the correlations (Mc Nemar, 1955).

The assumption that the strength of indirect aggressive habits within a particular social group is determined by inhibition of direct aggression in certain situations, e.g. because within his group an individual is younger, physically weaker, or equipped with a lower intellectual capacity than the average, or because his communication habits with others of the same age are weak, received only small support. The correlations between these variables and the factor scores for the aggression factors were low, and only some of them were significantly different from zero.

Age correlated negatively with the amount of aggression, but significantly ( $p < .01$ ) only with indirect aggression (a), which supported the hypothesis. Contrary to the hypothesis, the differences between the correlations concerning age and indirect aggression, and age and direct aggression, were not significant. Small stature correlated positively ( $p < .01$ ) with indirect aggression (a) which also supported the hypothesis. The positive correlation ( $p < .05$ ) between large stature and indirect aggression (b) is perhaps related to fatness typical of passive boys. The correlations concerning *intellectual development* were not significant. With regard to *verbal development*, there was one significant correlation, and the differences between the correlations accorded with the hypothesis.

As far as the hypothesized variables for communication habits are concerned

it could be seen that direct aggression correlated positively with *general activity* and *leadership*, whereas indirect aggression (b) was characteristic of withdrawn and passive individuals. The differences between the correlations supported the hypothesis. A small *number of children* in a family did not correlate with indirect aggression as expected, with the exception of mimic aggression, which correlated with background variables in much the same way as the factors of indirect aggression.

Of the mode of aggression it was predicted in **Hypothesis B. 3** that physical aggression correlates positively with physical fitness, verbal aggression with verbal ability, and both of them with general activity more highly than mimic aggression. Only the factors for defensive aggression were interpretable on the basis of the mode of aggression. The hypothesis was partly supported.

The correlations between *general activity* and the modes of defensive aggression supported the hypothesis. In addition, the difference in the correlations between leadership and the verbal or mimic mode of aggression agreed with the hypothesis.

Verbal defensive aggression correlated significantly with *verbal development*. The result supported the hypothesis; yet the correlation did not differ from the corresponding correlation of physical defence. The negative correlation of mimic aggression was, however, significantly ( $p < .05$ ) different from those mentioned above.

The index of *stature* (Appendix A. 1) was employed as an estimate of physical fitness. It did not correlate with the mode of aggression as expected. On the basis of the results the hypothesis could not, however, be nullified; the correlations should be re-examined by employing variables which would measure physical fitness from a greater variety of aspects.

It was predicted in **Hypothesis B. 2** that variables reflecting (a) control of behaviour and (b) the amount of experienced deprivations correlate with offensive and defensive aggression. Only one of the primary factors of aggression was interpretable mainly as offensive aggression. Defensive aggression independent of offensive aggression was represented by the factors of physical and verbal defence. (Both of the factors for indirect aggression as well as the mimic aggression factor involved both defensive and offensive aggression.)

The independent variables consisted of 19 personality and social background variables (Appendix A. 1, Problem B). To reduce the number of dimensions, the background variables were transformed into factor-level variables.<sup>1</sup> The eigenvalues of the first six factors as a percentage of the sum of estimated communalities was 95.8.

The variable of poor home conditions divided into two factors (I and VI). *Factor I* was interpreted as *indifference toward the child*;

<sup>1</sup> The rotated factor matrix is obtainable mimeographed.

this being independent of the social status. *Factor VI* represented *low socio-economical status*.

The variances of general activity and leadership were also explained by two factors (II and IV). *Factor II* was interpreted as *socially acceptable activity*, the opposite of which consisted of passiveness, low level of intellectual and verbal development, and unpopularity,<sup>1</sup> and *Factor IV* as *uncontrolled behaviour*.

*Factor V* was a specific *age factor*; in the sample the subjects attending whole-day courses had been younger than those attending half-day courses. *Factor III* was spanned by *exceptional vs. normal home relations*: if the parents were divorced or if the child was illegitimate, there were fewer children in the family, and the subject was the only or the youngest child more often than when the family relations were normal.

Dependences of aggressive habits on background variables were examined at the factor level by the method of linear regression analysis. The variables were transformed into factor-level variables by means of factor scores. The independent variables consisted of the factor scores for the background variables. Each factor score for the seven primary factors of aggression was treated separately as a dependent variable.

The results obtained by seven regression analyses are summarized in Table 3. (The intercorrelations of the predictor variables were not significantly different from zero.)

It was hypothesized (Hypothesis B. 2) that the habit strength of *offensive aggression* is determined by parents' indifference toward the child arousing secondary motivation of aggressive behaviour, and possibly also by other background factors which may cause him deprivations and feelings of inferiority. The regression coefficients indicated that the dependence between the factor of parents' *indifference toward the child* and the offensive aggression factor was significant, whereas, the dependences between the former and the factors for direct defensive aggression were not. The result supported the hypothesis. The regression coefficient of the factor of *low socio-economical status* in the offensive aggression factor, however, was not significant. This contradicted the hypothesis.

A further assumption was that the dependence between the *lack of control of behaviour* and the habit of offensive aggression is stronger than that between the former and the habit of direct defensive aggres-

<sup>1</sup> The interdependences were probably strengthened as a result of the method used for gathering material.

Table 3. Results of the regression analyses, factor scores for background and aggression variables

Independent variables	Defensive aggression		Offensive aggr.	Indirect aggression		Mimic aggr.	Halo factor	
	Phys.	Verb.		(a)	(b)			
I Indifference toward the child	-.06	.05	.16*	.12 <sup>1</sup>	.08	.08	.12*	
VI Low socio-economical status	.04	.05	.09	-.07	.01	.00	.25***	
IV Uncontrolled behaviour	.07	.14*	.35***	.05	-.18**	-.09	.50***	
II Socially approved activity	.09	.09	-.08	-.07	-.03	-.07	-.05	
V Age (age reversed)	.06	.09	.13 <sup>1</sup>	.21**	.08	.15*	-.06	
III Normal (vs. exceptional) family relations	.02	-.04	-.09	.03	-.12 <sup>1</sup>	-.12 <sup>1</sup>	-.12 <sup>1</sup>	
	R	.17	.24	.42***	.24*	.29*	.25*	.58***

\* Significant at .05 level.

\*\* Significant at .01 level.

\*\*\* Significant at .001 level.

<sup>1</sup> Significant at .1 level.

sion. The regression coefficients were consistent with the hypothesis. The regression coefficients of the factor of *socially approved behaviour* were not significant.

Of the two remaining factors of background variables only *the age factor* predicted, to some extent, the habit strength of offensive aggression. The age factor had been loaded significantly not only by age but also by the whole-day course and exceptional family relations variables. Both of these correlated significantly with the factor scores for offensive aggression ( $r = .25$ ;  $p < .001$ , and  $r = .16$ ;  $p < .01$ , respectively), while the correlation between age and offensive aggression was not significant. The regression coefficient of the age factor in the offensive aggression factor could perhaps be interpreted through secondary motivation of offensive aggression: a child spends 8—9 hours a day in a big group of children, with only a few teachers. This may result in a desire to attract attention at least negatively, especially if his family relations are somehow exceptional, in which case he has possibly been neglected. Another reason for a child's nonacceptable behaviour is probably the fact that it is tiring for him to stay with other children for such a long time. This increases his susceptibility to conflicts, and in this way also the amount of offensive aggression.

The significant dependence between the age factor (Factor V) and the *indirect aggression factor (a)* was parallel with that between the former and the offensive aggression factor. In this case the regression coefficient was, however, interpretable mainly through the negative correlation between age and the habit strength of indirect aggression, the interpretation of which has been presented earlier. Also the factor of indifference toward the child was slightly related to the indirect aggression factor (a). The habits of both indirect and offensive aggression were assumed to develop from primary defensive aggression under certain conditions.

The dependences between the factors for background variables and the *indirect aggression factor (b)* were, to some extent, similar to those between the former and the *mimic aggression factor*. These aggressive habits, particularly that of indirect aggression (b), were characteristic of passive boys and of boys who came from families with only a few children (often the subject was the only child); in many cases the parents were divorced or the child was illegitimate.

The dependences between the seventh factor, called the *halo factor*, and the background variables proved to be stronger than those between the factors reflecting actual aggressive habits, and the background variables; the multiple correlation of the halo factor was larger than those of the other factors for aggression variables. The best predictors were the factors of uncontrolled behaviour and low socio-economical status. The latter did not predict any other aggression factor.

Although the regression coefficients were small, there were dependences between aggressive habits and background variables that were consistent with the hypothesis. As the dependences had been obtained by employing the factor scores, they were likely to be more reliable than the correlations at the variable level.

### 5. 3. Dependence of global rating of aggressiveness on aggressive habits and background variables

#### 5. 3. 1. *Dependence of global rating of aggressiveness on aggressive habits*

It was predicted in Hypothesis C that global rating of the trait of aggressiveness is determined primarily by the amount of offensive and indirect aggression, while direct defensive aggression independent of offensive aggression was assumed to have relatively slight effect on it in the case of boys aged 5—6.

The independent variables consisted of the factor scores for the seven primary factors of aggression. The dependent variables consisted of five variables of aggression judged according to a general impres-



sion: aggressiveness, which was considered the main variable for global rating of the trait of aggressiveness, frustration tolerance, position in the dominance hierarchy (teased by others, feared by others) and secondary motivation of aggressive behaviour. The intercorrelations of the dependent variables varied  $+.26$  —  $+.46$ .<sup>1</sup>

Dependences between the independent and dependent variables were examined by the method of linear regression analysis by treating each trait-rating variable for aggressiveness separately as a dependent variable. The results of the five regression analyses are summarized in Table 4.

Table 4. Results of the regression analyses, trait-rating variables of aggressiveness, and factor scores for aggression variables

Independent variables	Aggressiveness (vs. peacefulness)	Frustration tolerance: low	Position in dominance hierarchy		Motivation of behaviour: secondary
			Teased	Feared	
1. Offensive aggression	.45***	.52***	.21**	.35***	.35***
2. Indirect aggression (a)	.16*	.26***	.10	— .01	.10
3. Indirect aggression (b)	— .01	— .28**	.08	.05	— .06
4. Physical defensive aggression	.04	.08	— .04	— .19**	.08
5. Verbal defensive aggression	.00	.29***	.10	.04	— .05
6. Mimic aggression	.10	— .01	.21**	.06	.05
7. Halo factor	.55***	.43***	.30***	.39***	.35***
R	.61***	.65***	.41***	.54***	.54***

The regression coefficients of the aggression factors in the variable of *aggressiveness (vs. peacefulness)* were parallel with the hypothesis, yet lower than expected. The best predictor was the halo factor. Contrary to the hypothesis, the multiple correlation of aggressiveness (vs. peacefulness) was not higher than that of the variable for frustration tolerance (a child tends to display aggression with very little reason — only after severely provoked).

<sup>1</sup> The intercorrelation matrix is obtainable mimeographed.

All the regression coefficients of the *offensive aggression* factor were significant, the largest of them being in the variable for low frustration tolerance and in aggressiveness (vs. peacefulness). The result supported the hypothesis. When both the high loading of the offensive aggression factor on the first principal factor in the second order factor structure (on the general overt aggression factor), and the dependences between the offensive aggression factor and global rating of aggressiveness are taken into account, it seems probable that this habit of aggression is *the best indicator of what is meant by aggressive behaviour*.

The largest regression coefficients of the *indirect aggression factor (a)* were found in the variables of low frustration tolerance and aggressiveness. As expected, they were smaller than the corresponding coefficients of offensive aggression. The other coefficients of the indirect aggression factor (a) were not significant.

Contrary to the hypothesis, the regression coefficient of the *indirect aggression factor (b)* in aggressiveness was not significant, and in the variable of frustration tolerance it was significantly negative. The latter indicated that the habit of indirect aggression (b) was more characteristic of boys with a high than of those with a low frustration tolerance. Moreover, it had been found out earlier that the strength of this habit correlated positively with passiveness. It is possible that these boys have overlearned inhibition of emotional and spontaneous reactions; they can be called »overcontrollers» (Block & Martin, 1955). The indirect aggression factor (b) represented a form of aggression whose existence, in the theoretical frame of reference, had not been predicted.

The regression coefficients of the factors of *physical, verbal and mimic defensive aggression* in aggressiveness (vs. peacefulness) were not significant, which supported the hypothesis. The regression coefficient of the *verbal aggression factor* in frustration tolerance, however, was significant, which was parallel with the significant dependences between the factors of verbal aggression and uncontrolled behaviour (Table 3). The nonsignificant regression coefficients of the *physical defensive aggression factor* independent of offensive aggression suggested that the strength of this aggressive habit was not a powerful determinant of the impression about aggressive personality. On the contrary: the dependence between the physical aggression factor and position in the dominance hierarchy indicated that, unlike offensive boys, defensive boys were not feared by others. Yet physically defensive boys were not in a low position in the »pecking order» of the group, as shown by the nonsignificant regression coefficient in

the variable »teased by others«. The significant regression coefficient of the *mimic* aggression factor in this variable was in accordance with the dependence between the *mimic* aggression factor and passiveness, which had been interpreted as being connected with weak communication habits and inability to defend oneself.

The regression coefficients of the *halo factor* were very significant. The largest of them was found in aggressiveness (vs. peacefulness). With the regression coefficients (Table 3) of the factors of uncontrolled behaviour and low socio-economical status in the *halo factor* taken into account (the latter did not predict any other aggression factors), the interpretation of the *halo factor* can be considered justified.

### 5.3.2. Description of global rating of aggressiveness in terms of the different groups of variables

It was predicted in Hypothesis C that global rating of the trait of aggressiveness is determined not only by aggressive habits but also by individual background variables and the targets and scenes of aggression characteristic of an individual's aggressive behaviour.

In order to find out those aspects of global rating of aggressiveness and of the predictor variables most closely related to each other, a canonical analysis was carried out. The dependent (criterion) variables consisted of the same five trait-rating variables as those in the regression analysis described in the preceding chapter.

The independent (predictor) variables (16) consisted of three groups of variables:

- 1) factor scores for the seven primary factors of the aggression variables,
- 2) factor scores for the six factors of the background variables, and
- 3) factor scores for the three factors of the situational variables.

The factors of the situational variables were obtained as follows. On the basis of the teachers' ratings concerning the targets and scenes of aggressive responses the sum scores were calculated for each subject over all the aggression variables in each situational variable. The intercorrelations of the sum scores varied  $+ .38$  —  $+ .77$ . To reduce the number of dimensions and the harmful influence of multicollinearity these variables were also transformed into factor-level variables by means of factor scores. The rotated factor matrix is presented in Table 5.

Table 5. Rotated factor matrix, situational variables

Variables	I	II	III	h <sup>2</sup>
Target of aggression				
Teacher	23	82	18	76
Taller boy	71	38	26	72
Boy of the same size	79	24	21	73
Smaller boy	38	22	69	67
Girl	29	38	70	71
Scene of aggression				
Free play periods outdoors	76	09	37	72
Free play periods indoors	56	42	49	74
Periods of directed activity	23	76	43	81

*Factor I* indicated that the amount of aggression toward taller *boys* and that toward boys of the same size were closely related to each other. This type of aggression was frequent during free play periods both outdoors and indoors.

*Factor II* was spanned mainly by aggression toward a *teacher* and during periods of directed activity; it thus reflected the kind of aggressive behaviour that most clearly breaks norms in regard to both the target and scene of aggression.

*Factor III* reflected aggression toward *girls and smaller boys*. All the variables for the scene of aggression were also loaded on this factor.

The correlations of the factor scores for the situational variables to the factor scores for the aggression and background variables are presented in Table 6.

Table 6. Correlation coefficients of situational variables to aggression and background variables, factor scores

Factors of situational variables	Aggression factors							Background factors					
	Offensive aggression	Indirect		Physical defence	Verbal defence	Mimic aggression	Halo factor	Indifference toward child	Socio-economic status	Socially approved activity	Uncontrolled behaviour	Age (reversed)	Normal family relations
		(a)	(b)										
I	24***	09	—08	06	20**	12	46***	20**	16*	14*	35***	—02	02
II	37***	03	—04	12	—04	11	29***	27***	19**	03	32***	13	—07
III	23***	11	—03	07	19**	13	32***	21**	24***	08	25***	22**	00

All the factors of the situational variables correlated significantly with the offensive aggression factor, halo factor, and the factors for indifference toward the child, low socio-economical status, and uncontrolled behaviour. In addition, aggression toward peers (Factors I and III) correlated particularly with the verbal defensive aggression factor.

The interdependences of the independent variables are shown in Tables 3 and 6. The factor scores for the same group of variables did not intercorrelate highly. The highest correlation coefficients did not exceed  $|0.16|$ .

The results of the canonical analysis are shown in Table 7. The maximum canonical correlation obtained was 0.82, which was statistically very significant. The second and the third canonical correlation were also significant. Consequently, the independent variables as linear combinations accounted for the variance of the trait-rating variables of aggressiveness in at least three different ways.

*The first pair of axes ( $p < .0005$ ):* The variance of low frustration tolerance, aggressiveness, secondary motivation of aggression, and position in the dominance hierarchy was accounted for by the offensive aggression factor and the halo factor to a statistically significant extent. The result was in accordance with those obtained earlier by the regression analysis. The first vector-pair was also lightly weighted by the indirect aggression factor (a), the factor of uncontrolled behaviour, and the factors of situational variables. It had been predicted that the variance of the trait-rating variables of aggressiveness would be accounted for by those situational variables which represent the amount of aggression directed toward those persons and occurring in those situations generally requiring strong control of behaviour. This type of aggression was reflected by Factor II of the situational variables, and to some extent also by Factor III. The first vector-pair was not, however, weighted more heavily by Factors II and III than by Factor I; the loadings of the factors of the background variables were also lower than expected.

*The second pair of axes ( $p < .0005$ ):* The variance of variable 3 (teased by others) was accounted for by the factor of socially approved behaviour; the negative loading indicated that a low position in the dominance hierarchy was related to a low intellectual capacity, passiveness and unpopularity. The second vector-pair was weighted also by the factor containing aggression toward girls and smaller boys, and to a small extent by the factor of indifference toward the child.

*The third pair of axes ( $p < .005$ ):* The other part (cf. the first vector-pair) of the variance of the variable of low frustration tolerance was accounted for by the factors of physical and verbal defen-

Table 7. Canonical correlations and vectors

Variables Predictors	Latent vectors			
	1	2	3	4
Aggression factors				
1. Offensive aggression	57	-25	-09	-19
2. Indirect aggression (a)	24	-11	24	10
3. Indirect aggression (b)	01	05	-36	-03
4. Physical defensive aggression	03	11	28	23
5. Verbal defensive aggression	03	-01	29	-32
6. Mimic aggression	00	07	-30	-07
7. Halo factor	47	-08	-34	-24
Background factors				
8. Indifference toward the child	15	29	-19	06
9. Low socio-economical status	-05	-10	-06	32
10. Socially approved activity	07	-56	10	-03
11. Uncontrolled behaviour	29	-23	-31	-21
12. Age (age reversed)	-10	14	07	-36
13. Normal (vs. exceptional) family	03	05	-03	-08
Factors of situational variables				
14. Aggression toward boys (I)	27	20	49	02
15. Aggression toward the teacher (II)	25	07	18	55
16. Aggression toward smaller peers (III)	23	34	05	06
Criteria				
1. Aggressiveness (vs. peacefulness)	49	-23	-27	-15
2. Low (vs. high) frustration tolerance	64	-28	78	-25
3. Position in dominance hierarchy { teased by others	-09	89	-03	-30
4. nance hierarchy { feared by others	37	-22	-57	-26
5. Motivation of aggression: secondary	46	16	-07	87
Canonical R	82	52	43	35
Chi square	350.53	135.56	74.11	35.37
df	80	60	42	26
p<	.0005	.0005	.005	.1

sive aggression and by the factor of aggression toward boys, high frustration tolerance was accounted for by the factors of indirect aggression (b) and mimic aggression. The negative loadings of the halo factor and the factor of uncontrolled behaviour can be explained as due to the orthogonality between the predictor variates III and I. The negative loadings of those dependent variables which, together with the variable of frustration tolerance, were weighted in the first criterion variate, can be understood correspondingly.

The *fourth* canonical correlation was not large enough to be statistically significant. The fourth vector-pair could, however, be given a meaningful interpretation: it can be employed as a guideline. The variance of the variable of *secondary motivation* of aggression (by means of his aggressive behaviour a child attempts to satisfy his needs which have remained unsatisfied, e.g. tries to be leader of his group or to attract attention) was best accounted for by Factor II of the situational variables. Factor II contained the amount of aggression directed toward those persons and occurring in those situations generally requiring strong control of behaviour. The fourth vector-pair was weighted also by the factor of low socio-economical status and the age factor (the aggressive behaviour of older children was motivated secondarily to a greater extent than that of younger children).

No vector-pair was weighted by Factor III of the background variables, which contained the number of children in the family and exceptional vs. normal family relations.

On the basis of the canonical correlations the conclusion could be drawn that the variance of the five global variables of aggressiveness rated by the kindergarten teachers was not limited to one general halo dimension that could be considered an interpretation of the first canonical vector-pair. This general aspect had been present most clearly in the rating of the variable aggressiveness vs. peacefulness. Of the aggressive habits the habit strength of offensive aggression had been the foremost basis for the global rating of aggressiveness, as shown by the results of both the canonical analysis and the regression analysis (p. 69). The variance of the rating of an individual's low frustration tolerance was also explained by the habit of defensive aggression independent of offensive aggression. Besides these, there were two other aspects of aggressive behaviour: aggression toward smaller peers, which was related to a low position in the dominance hierarchy, and aggression toward a teacher, which was related to the secondary motivation of aggression.

#### 5. 4. Effects of situational control on aggressive behaviour

##### 5. 4. 1. *Effects of situational control on the frequencies of different forms of aggression*

The aggressive behaviour of an individual was assumed to vary according to the stimulus situation in spite of his average aggressive habits. It was predicted in **Hypothesis D** that situational control (defined p. 42) affects both the frequencies of different forms of aggression and the structure of aggression.

In order to study the frequencies of different forms of aggression

in different situations (with various targets and scenes) the aggression variables were classified by employing the empirically obtained descriptive model of the aggressive responses (Figure 2, p. 54). From the scores obtained by the teachers' ratings concerning the situational variables the sum scores were calculated over all the subjects for each situational variable, considering 1) all the aggression variables (items 1—32), 2) the variables of direct (items 1—8, 10—12, 18—19, 23—29) and 3) indirect (items 9, 13—17, 20—22, 30—32) aggression, and 4) the variables representing each of the quadrants direct-defensive, direct-offensive, indirect-defensive, and indirect-offensive aggression. The sum scores for each situational variable as percentages of the sum scores over all the situational variables are presented in Table 8.

In connection with the selection of the targets of aggression it was assumed, on the basis of the frequencies of aggression presented by Dawe (1934), Jersild & Markey (1935), Graham et al. (1951), Cohen (1955), and Walters et al. (1957), that, on the average, situational control is strongest when the target is a teacher, next strongest when it is a taller boy, a girl, a smaller boy, and weakest when the target is a boy of the same size. The concept of situational control was defined by using as a criterion the strength of the inhibition of direct, defensive, physical aggression. The rating scores for the targets of this form of aggression were distributed as follows: teacher 1.5 %, taller boy 18.5 %, girl 17.9 %, smaller boy 23.1 %, boy of the same size 39.0 %. The distributions for the scenes were: periods of directed activity 16.9 %, free play periods indoors 38.3 %, free play periods outdoors 44.8 %.

The amount of total aggression toward teachers was significantly ( $p < .001$ ) smaller, and that toward boys of the same size significantly ( $p < .001$ ) greater than if the ratings for the target had been completely random. The frequency distribution of the rating scores was as expected, and the scores could not be considered random. Correspondingly, the amount of total aggression during periods of directed activity was significantly ( $p < .001$ ) smaller, and that during free play periods outdoors significantly ( $p < .001$ ) greater, compared with the random distribution. The result supported the hypothesis: all the forms of aggression considered, more aggression appeared with weak than with strong situational control.

The difference in the frequency distributions for the *targets* between direct and indirect aggression were smaller than expected. In both cases the distributions followed the total distribution. In accordance with Hypotheses D. 1 b and D. 1 c, the amount of indirect



Table 8. Frequency distributions of the rating scores for the situational variables, percentages

Form of aggression	Target of aggression				
	Teacher	Taller boy	Girl	Smaller boy	Boy of the same size
Total distribution %	9.1	21.7	17.3	19.0	33.0
$\sigma$ (P)	2.1	2.8	2.6	2.7	3.2
Direct aggression %	8.6	21.1	17.7	19.6	32.9
Indirect aggression %	10.8	23.8	15.5	16.7	33.2
Direct defensive %	6.8	22.1	16.4	19.5	35.1
Direct offensive %	11.0	19.7	19.5	19.8	30.1
Indirect defensive %	12.3	25.4	13.4	15.3	33.6
Indirect offensive %	8.7	21.7	18.3	18.7	32.8

Form of aggression	Scene of aggression		
	Directed activity	Free play period indoors	Free play period outdoors
Total distribution %	21.8	36.3	41.9
$\sigma$ (P)	2.8	3.3	3.4
Direct aggression %	21.6	36.6	41.8
Indirect aggression %	22.3	35.4	42.3
Direct defensive %	19.7	36.8	43.5
Direct offensive %	24.1	36.3	39.6
Indirect defensive %	21.9	35.2	42.9
Indirect offensive %	22.9	35.9	41.2

aggression toward teachers and taller boys (due to the amount of indirect defensive aggression in particular) was, however, proportionally somewhat greater than the amount of direct aggression toward them. The reverse difference was found in aggression toward girls and smaller boys, not in aggression toward boys of the same size as expected in Hypotheses D. 1 b and D. 1 c. The amount of indirect aggression was determined by the power of the target rather than by general controlling and inhibiting factors such as advice and instructions (girls or smaller peers should not be harmed). A probable interpretation of the result is that when the attacker is more powerful than the target, his chances of eliminating the thwarting stimulus are more varied than when the target is more powerful. In this opposite case the instigated aggression can be displayed indirectly.

The frequency distributions for the *scenes* in the different forms of aggression followed the total distribution even more closely than those for the targets. The most remarkable exception was found in direct offensive aggression: contrary to Hypothesis D. 1 c, the amount of direct offensive aggression was relatively great during periods of directed activity, and relatively small during free play periods outdoors. The result was due to the fact that half of the variables for offensive aggression contained disturbance of a group's activities, and that periods of directed activity had been rated as the scenes of these disturbances as often as the other alternatives (in general, the differences between the scenes were clearly parallel with the total distribution).<sup>1</sup>

#### 5. 4. 2. *Effects of situational control on the structure of aggression*

It was predicted in Hypothesis D. 2 a that with the employment of the factor analysis method more differentiation takes place in interindividual differences in direct (defensive and offensive) aggression with weak situational control than when the factorial structure is based on average frequencies of aggression independent of situational variables. Hypothesis D. 2 b was formulated correspondingly so as to concern interindividual differences in indirect aggression with strong situational control.

The intercorrelations of the aggression variables for each situational variable were calculated, and the factor analysis and varimax rotations were carried out for each of them. The correspondence of the structures to the primary factor composition technically independent of them was investigated by the method of symmetric transformation analysis. (In this method, developed by Mustonen, divergent transformation is to a large extent similar regardless of the direction of transformation.) The analyses were based on the orthogonal five-factor rotations. An attempt was also made to carry out transformation analyses on the basis of the six-factor and seven-factor rotations, but the number of factors was too great. The transformation analy-

<sup>1</sup> The frequency distributions for the aggression variables as raw scores as well as the distributions of the targets and scenes for each variable are obtainable mimeographed. It can be seen from this table that the most usual aggressive response in kindergartens was verbal resistance (5; e.g. go away) against boys of the same size and during free play periods outdoors. The most unusual aggressive response was offensive aggression toward another person by means of teasing somebody under his protection (31).

tical comparisons were made, as mentioned above, for all the situational variables except aggression toward teachers; the distribution of the rating scores for aggression toward teachers was sufficient for multidimensional analyses in only 17 variables.

The primary factor composition of the aggression variables, yielded by the five-factor rotation, was comparable with that yielded by the seven-factor rotation:

*Factor I:* Indirect aggression containing both of the indirect aggression factors (a and b) interpreted pp. 56—57.

*Factor II:* Halo factor corresponding closely to the factor interpreted p. 58.

*Factor III:* Offensive aggression corresponding closely to the factor interpreted p. 56.

*Factor IV:* Mimic aggression corresponding closely to the factor interpreted p. 58.

*Factor V:* Direct defensive aggression independent of offensive aggression containing the factors of physical and verbal defensive aggression (interpreted p. 57). The factor was loaded most highly by verbal threatening, fighting, physical resistance, and scornful remarks.

The transformation matrices L (P, S) and the residuals, by factors, are presented in Table 9.

*Target of aggression.* »Abnormal» or divergent transformation (shown by the residuals) was altogether rather small. The smallest total residuals were obtained when the factor configurations for taller boys and girls were represented in the factor space for the primary factors, and the largest total residual in the transformation of the factor configuration for boys of the same size in this same factor space. The stronger inhibitions of direct aggression (due to the power of the target) or the general controlling stimuli connected with it had been, the better was the correspondence between the factor composition for the aggression variables operationalized by the rated frequencies of aggression toward this particular target, and for the same aggression variables operationalized by the rated frequencies of aggression over different situations.

*Scene of aggression.* The differences in divergent transformation between the factor structure for periods of directed activity and for free play periods indoors, when both of them were represented in the factor space for the primary factors, were parallel to that obtained for the target variables: the correspondence between the factor structure and the primary factor composition was somewhat better with strong than with weak situational control. This generalization was not, however, applicable to the factor structure for free play periods outdoors; the residuals were smallest although situational control was

Table 9. Matrices L (P, S), transformation matrices, and matrices  
 Diag E (P, S)' E (P, S), residuals by factors

P = primary factors of the aggression variables  
 S = factors of the aggression variables for each situational variable

Primary factors		Target of aggression														
		Boy of the same size					Taller boy									
		I	II	III	IV	V	I	II	III	IV	V					
Indirect aggr.	I	93	00	12	05	-15	60	07	-11	00	79					
Halo factor	II	45	85	-28	44	84	39	67	-38	31	-41					
Offensive aggr.	III	06	05	61	-22	84	39	23	84	-22	-20					
Mimic aggr.	IV	04	-22	32	96	23	13	-36	27	89	-03					
Direct defensive	V	-47	48	19	04	-60	-56	61	26	26	41					
Residuals by factors		0.61	0.71	1.00	0.54	1.34	1.00	0.44	0.55	0.49	0.82					
Total residual		4.20					3.31									
Primary factors		Smaller boy					Girl									
		I	II	III	IV	V	I	II	III	IV	V					
		Indirect aggr.	I	69	-02	10	10	71	98	17	04	05	11			
Halo factor	II	40	82	-27	-01	-33	-13	43	16	-57	67					
Offensive aggr.	III	10	21	94	-20	-19	-03	05	98	07	-20					
Mimic aggr.	IV	18	-16	15	90	-33	-01	-53	14	47	70					
Direct defensive	V	-58	52	11	36	49	-17	71	-06	67	10					
Residuals by factors		0.93	0.50	0.79	0.62	0.95	0.56	1.06	0.54	0.54	0.73					
Total residual		3.78					3.43									
Primary factors		Scene of aggression														
		Free play outdoors					Free play indoors					Directed activity				
		I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
I	99	00	07	02	08	80	38	-41	24	00	83	-13	10	53	06	
II	00	84	-19	52	-03	09	31	70	42	-49	-50	-07	42	64	40	
III	-06	28	95	-10	00	44	04	56	-58	39	14	62	73	-17	-20	
IV	-03	-47	23	85	-01	24	-66	19	57	38	-04	77	-54	32	13	
V	-08	02	-01	03	1.00	-33	57	08	32	67	21	07	05	-41	88	
Residuals by factors		0.46	0.30	0.56	1.01	0.59	0.95	0.89	0.94	0.49	0.93	0.91	0.62	0.62	1.05	0.75
Total res.		2.92					4.20					3.95				

weakest. It is possible that as the field of observation had been wider during free play periods outdoors, the ratings of interindividual differences had been more global and more dependent on the total impression concerning the frequencies of aggressive responses than the ratings concerning free play periods indoors.

The information provided by the total residuals on structural invariance can be supplemented by considering the transformation matrix coefficients ( $L$ ) together with the residuals ( $R$ ) of the factors. The coefficients are summarized in Table 10, organized as follows. The similarity indices of the expected corresponding factors are given first, and they are followed by  $L$ -coefficients  $\geq 0.40$  indicating into which primary factors the variance of the factor for a particular situational variable was divided. No formula has been developed for the estimation of the standard error of  $L$ -coefficient. The correspondence between the factors has been considered very good if  $L \geq 0.80$  (Niskanen, 1968; et al.). According to Niskanen, the correspondence is moderate if  $0.30 < L < 0.50$ . The standard error of the factor coefficient of 0.40, if the number of subjects is 200, is 0.07 (Harman, 1967, p. 435); the loading of 0.40 thus deviates very significantly ( $p < .001$ ) from zero. If the standard errors of  $L$ -coefficients correspond approximately to those of the factor coefficients,  $L = 0.40$  can be considered as an indication of real correspondence between the factors.

*Target of aggression.* As regards indirect aggression, the results of the transformation analyses accorded with the hypothesis: more differentiation took place with strong situational control than the primary factor composition indicated, or than with weak situational control.

(1) When the factor configurations for taller boys or boys of the same size as targets of aggression were represented in the factor space for the primary factors, the residual of the indirect aggression factor for taller boys was greater than that for boys of the same size.

(2) There was a very good correspondence between the first primary factor (indirect aggression) and Factors I for boys of the same size and for girls, whereas the variance for indirect aggression divided into two factors for smaller and taller boys.

(3) The finding of structural invariance in indirect aggression shown by the very good correspondence between the first primary factor and Factor I for girls was complicated by the similarity indices for the mimic aggression factor: interpretationally, the mimic aggression factor was close to the indirect aggression factor. In the mimic aggression factor the correspondences were very good except in the com-

Table 10. Comparison of the factor structures

Primary factors	Boy of the same size	Smaller boy	Girl	Taller boy
I Indirect aggression	I L <sup>1</sup> = .93 ; R <sup>2</sup> = 0.61 Indirect aggression.	I L = .69 ; R = 0.93 Aggression displayed toward objects.  V L = .71 Aggression displaced toward other persons, crying.	I L = .98 ; R = 0.56 Indirect aggression.	I L = .60 ; R = 1.00 Aggression displaced toward other persons. Taller boys: indirect physical offensive aggression.  V L = .79 Aggression displayed toward objects, swearing.
IV Mimic aggression	IV L = .96 ; R = 0.54 Mimic aggression.	IV L = .90 ; R = 0.62 Mimic aggression.	IV L = .47 ; R = 0.54 Aggression displayed by facial gestures and physical resistance.  V L = .70 Aggression displayed by sulk and lenient verbal responses.	IV L = .89 ; R = 0.62 Mimic aggression.
II Halo factor	II L = .85 ; R = 0.71 Direct defensive aggression with different modes; independent of offensive aggression.  V L = .84 Physical defensive and offensive aggression. I L = .45 IV L = .44	II L = .82 ; R = 0.50 Direct defensive aggression with different modes, particularly verbal offensive aggression.  I L = .40	II L = .43 ; R = 1.06 Direct defensive aggression with different modes, some verbal offensive aggression.  V L = .67	II L = .67 ; R = 0.44 Direct defensive aggression with different modes, physical offensive aggression.
III Offensive aggression	III L = .61 ; R = 1.00 Particularly verbal offensive aggression. Defence by swearing and threatening.  V L = .84	III L = .94 ; R = 0.79 Offensive aggression.	III L = .98 ; R = 0.54 Offensive aggression.	III L = .84 ; R = 0.55 Offensive aggression.
V Direct defensive aggression.	V L = .60 ; R = 1.34 II L = .48	V L = .49 ; R = 0.95 II L = .49	V L = .10 ; R = 0.73 II L = .71 IV L = .67	V L = .41 ; R = 0.82 II L = .61

<sup>1</sup> L = transformation matrix coefficients

<sup>2</sup> R = residuals by factors

Table 10. (continued)

Primary factors	Free play outdoors	Free play indoors	Directed activity
I Indirect aggression	I L=.99 ; R=0.46 Indirect aggression.	I L=.80 ; R=0.95 Indirect aggression, physical offensive aggression.	I L=.83 ; R=0.91 Indirect aggression.  IV L=.53 Aggression shown by cry and sulk or displaced toward other persons.
IV Mimic aggression	IV L=.85 ; R=1.01 Mimic aggression.	IV L=.57 ; R=0.49 Mimic aggression and verbal resistance.	IV L=.32 ; R=1.05  II L=.53 Aggression shown by resentment and defiance. Breaking of rules, verbal offensive aggression.
II Halo factor	II L=.84 ; R=0.30 Physical defensive aggression.  IV L=.52	II L=.31 ; R=0.89 Aggression displaced toward other persons; also physical defensive and offensive aggression.  III L=.70 Physical and verbal offence by opposition and resistance (especially in periods of group activity).	II L=—.07 ; R=0.62  IV L=.64 III L=.42 Physical offence; also physical defence or threat of it. V L=.40 Verbal defence and offence, display of aggression toward objects.
III Offensive aggression	III L=.95 ; R=0.56 Offensive aggression	III L=.56 ; R=0.94  I L=.44	III L=.73 ; R=0.62  II L=.62
V Direct defensive aggression.	V L=1.00 ; R=0.59 Direct defensive aggression.	V L=.67 ; R=0.93 Verbal defensive and offensive aggression.  II L=.57	V L=.88 ; R=0.75

parison for girls. When the target of aggression was a girl, mimic aggression divided into two factors.

(4) Two factors identifiable as indirect aggression were also obtained in the factor analysis for aggression toward teachers. The number of variables included in the analysis was 17. Four factors were interpreted.

*Factor I* contained indirect aggression toward objects in particular, and of mimic aggression crying and threatening.

*Factor IV* was spanned by the variable of sulk and those for displacement and spread of aggression toward other persons.

*Factor II* included direct expressions of aggression.

*Factor III* contained the variables for disturbance of activities with both the defensive and offensive aim.

The results of the transformation analyses also accorded with the hypotheses for *direct* aggression: more differentiation took place with weak situational control than the primary factor composition indicated, or than with weak situational control.

(1) When the factor configurations for taller boys and for boys of the same size were represented in the factor space for the primary factors, the residuals of both the offensive aggression factor and the direct defensive aggression factor were greater for boys of the same size than for taller boys.

(2) There was a very good correspondence between the third primary factor (offensive aggression) and Factors III for taller boys, smaller boys, and girls, whereas the variance of offensive aggression divided into two factors for boys of the same size.

(3) The fifth primary factor, spanned by direct defensive aggression, had no counterpart in the other factor structures; the factors corresponding to it most closely were II and V. There was some overlap between the direct defensive aggression factor (V) and the halo factor (II). It can be interpreted as a consequence of the fact that the variables spanning the halo factor represented direct defensive aggression with different modes. A further interpretation is that the halo effect was more apparent and prolonged on the ratings of the targets, boys of the same size in particular, than on the ratings of the frequencies of aggression over different situations.

*Scene of aggression.* The correspondences between the primary factors and the factors for free play periods outdoors were very good. (The structural invariance has been discussed in connection with the inspection of the total residuals.) For the other scene variables the results of the transformation analyses accorded with the hypothesis:



more differentiation took place in indirect and mimic aggression with strong situational control (periods of directed activity) than the primary factor composition indicated. In direct defensive aggression the difference was the reverse: more differentiation took place in direct aggression with weak (free play periods indoors) than with strong situational control. There were no considerable differences between the structures in offensive aggression. The L-coefficients between the second primary factor (halo factor) and the factors for periods of directed activity suggested that the halo effect had been strong on the ratings of this particular scene of aggression.

The information provided by the transformation analyses on structural invariance gave preliminary support to the assumption that an individual has different habit hierarchies of aggressive behaviour in different situations. Particularly the target of aggression has consistent influence on the structure of aggressive behaviour. The finding can be utilized in further investigations, for example when an attempt is made to vary situational control in the items of an aggression test.