INDIVIDUAL DEVELOPMENT AND ENVIRONMENT

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THE DEVELOPMENT OF PATTERNS OF MALADJUSTMENT

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I. Theoretical background and methodological

considerations

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Abstract

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maladjustment. I. Theoretical background and methodological considera-
tions*. Individual development and environment. Department of Psycho-
logy, University of Stockholm. Report nr 50, 1983.--This study has been
performed within the project 'Individual development and environment'.
It constitutes the first part of an investigation into developmental
patterns of maladjustment. This report presents the theoretical back-
ground, as well as, methodological considerations. Three basic orienta-
tions are fundamental to this investigation, namely (1) the interactio-
nal perspective, (2) the view that maladjustment is not just a lesser
degree of adjustment, and (3) an emphasis on systematic observation
and description. The aim of the investigation is to provide a bird's eye
view of the development of maladjustment. To some extent the detail
or depth of a concentrated effort within limited area is sacrificed to
enable us to study the totality of an individual's maladjustment reaction.
A tentative taxonomy of maladjustment is presented which applies to the
time period from middle childhood to early adolescence. The taxonomy
is designed for the specific purpose of this project. In the concluding
sections of this report various methodological problems are discussed,
such as the construction of indicators of maladjustment, the detection
of syndromes of maladjustment, and the effect of errors of measurement
on the results.

CONTENTS

PURPOSE OF THE PROJECT

This project aims at studying the development of patterns of maladjustment from middle childhood to adult age. The emphasis is on a *description of patterns of maladjustment*, and how these evolve. Other variable domains will be included in the study, only to the extent they are necessary for providing a meaningful description.

It is the aim of the project to obtain information that makes it possible to make statements about the *prevalence* of the syndromes that are studied, and about the relationship between various forms of maladjustment in childhood and in adulthood. The emphasis is on general patterns of individual maladjustment rather than on single aspects of a syndrome. This study should be seen as complementary to the ordinary more specific studies. To some extent the detail or depth of a concentrated effort within a limited area is sacrificed to enable us to study the totality of an individual's maladjustment reaction.

The focus of this project is on maladjustment of various kinds in everyday life viewed from a developmental perspective, and a thorough psychiatric description is beyond the scope of the project. We use the term 'maladjustment' in a rather broad sense, including both extrinsic and intrinsic maladjustment (Magnusson, Dunér, & Zetterblom, 1975). With 'extrinsic maladjustment' we mean that the individual's behavior does not meet the demands or standards of others, for instance, conduct problems, peer problems delinquency or underachievement. With 'intrinsic maladjustment' we mean that there is a disagreement between the individuals needs, motives, and evaluations on the one hand, and on the other the rewards he gains as experienced by himself, for instance, prolonged feelings of misery, very low self-esteem.

The general aim of this project can be divided into several subsets which will be studied successively:
1. To develop a theoretical background including a taxonomy of maladjustment in middle and late childhood and to solve certain methodological problems.

2. To describe the patterns of maladjustment at different age
    stages.

3. To study the development of patterns of maladjustment with
    emphasis on the relationship between maladjustment in child-
    hood and in adulthood.

The present report concerns aim (1) above, and later reports will
cover (2) and (3).

THEORETICAL PERSPECTIVES

Three perspectives are fundamental in the project, namely (1) the
interactionistic perspective, (2) the view that maladjustment is not
just a lesser degree of adjustment, and (3) an emphasis on systematic ob-
servation and description,

(1) An interactional perspective

The interactional perspective means among other things that we have
to look at the interaction between the person and the environment in
which a certain behavior occurs in order to understand that behavior
(Magnusson, 1980; Magnusson & Endler, 1977). Recently the need for an
interactional perspective in the study of psychological development has
again been pointed out (Magnusson & Allen, 1983). There, logical argu-
ments, evidence, and examples are given which point to the limitations
in a conventional trait or variable approach to the study of development
(see also Magnusson & Stattin, 1983).

The interactional emphasis in the person-centered approach is cru-
cial (Magnusson & Allen, 1983 a,b,). In this approach the person is
conceptualized as an integrated totality, rather than as a summation of
variables. The aim is to understand individuals by trying to discover
(a) the distinctive configuration or pattern of organization of psycho-
logical functions that will satisfactorily characterize each person,
and (b) the lawful way in which he interacts with his environment,
across situations and across developmental stages, in a continuous

bidirectional, interactive process. This viewpoint leads to the conclusion that the *persons* rather than the *variables* should be the central -organizing principle. Thus, our main interest is in studying groups of individuals who are homogenous with respect to syndromes of maladjustment, and to study how these syndromes evolve rather than, for instance, studying the correlations over time for different variables.

Lamiell (1982) has criticized interactionistic developmental psychology for relying on various group statistics, for example, the correlation coefficient. He contends that choosing such analytical tools together with inadequate measurement models allows no valid statements to be made about *individual development*. However, much of his criticism appears to be exaggerated, for instance, his insistence that group statistics are of no relevance for understanding individual development. It is true that a correlation coefficient of, say, 0.90 for a characteristic measured at two points in time for a group of individuals does not permit us to say anything about any *specific* individual's development, but the figure contains very useful information about the stability of *most* person's individual development. It is true that a lower correlation, say 0.40, makes it difficult to say anything about most individuals' development, but this is due to the result structure, and is not an argument against the method per se. Nevertheless, Lamiell's criticism lends support to our basic emphasis on persons rather than on variables--for us the grouping of persons according to syndromes is more important than group statistics for variables.

One aspect of Lamiell's criticism which is relevant in this context is his emphasis on the danger of any kind of relative measures in which one person's score is in some way dependent on the scores of other persons. He advocates the construction of variables measured on absolute scales and standardized only with regard to the theoretical minimum and maximum of the scales. With our person oriented perspective, the limitations of using relative measures are obvious. These limitations become particularly serious when using relative measures in empirical studies of change (see, for instance, Bergman, 1971, 1972a; Woolwill, 1980). However, some important factors in individual development are best measured by ordinal data, e.g., popularity among peers. Generally, it is our intention to use absolute scales as far as they are reasonable and useful.

Focusing on maladjustment rather than on the whole adjustment spect-
rum makes the task of obtaining absolute measures somewhat easier,
since we do not attempt to discriminate over the whole adjustment con-
tinuum

(2) Maladjustment or adjustment--a matter of kind or degree?

From our interactional standpoint, which emphasizes the study of in-
dividuals as totalities, it is natural to view maladjustment as a syndrome
of individual characteristics in which, normally, several symptoms of
maladjustjment are involved. How these symptoms are grouped together
in individual patterns of maladjustment and how these patterns evolve
is the subject of the present research.

The view that a certain type of maladjustment is characterized by
a particular constellation of symptoms implies, among other things,
that one single symptom, even in extreme cases may not be an indicator
of maladjustment. It is in combination with other symptoms that it be-
comes an indicator of what we define as maladjustment.

The limitations of considering only single factors in the study of
maladjustment is obvious also for environmental factors operating in the
development of maladjustment. For example, low socioeconomic standard
in the home of a child, does not predispose for later maladjustment in
itself. Most children raised in such environments do not develop symp
toms of maladjustment. However, low socioeconomic standars may increase
the probability that weak social norms and/or bad social relations among
the family members, etc., lead to maladjustment.

The view of maladjustment as a pattern of symptoms manifested in
syndromes has implications for the planning and carrying through of empi-
rical research and for the interpretation of results of such research.
Two points will be made here.

1. Since each specific person factor or environmental factor is not
    the only indicator of maladjustment or predictor of later maladjust-
    ment, we cannot expect high coefficients for the relation between
    data for single factors and data for molar criteria of maladjustment,
    such as alcoholism, criminality, and mental illness.

2. When entering single factors into our research it is the negative
    aspect that is of particular interest for our study of symptoms of
    maladjustment. Generally, we do not expect any positive aspect of
    the possible operating factors to be included in the syndromes of
    maladjustment that we are studying. Therefore, theoretically and
    empirically our interest is in the discrimination among individuals
    in that part of a distribution of data for a specific symptom that
    can have symptom value with respect to maladjustment.

    It follows from the above that we are interested in the strength
of different symptoms of maladjustment, i.e., we are interested in the
negative end of the continuum of the adjustment variables. There are
several reasons for why one should concentrate the research effort in
this way when maladjustment is the focus of interest:

    Firstly, it is a truism that a child normally is very sensitive
to strong reactions from the environment to his behavior. To many
forms of maladjusted behavior, society reacts very strongly--a reaction
which is quite absent within the region of good to normal adjustment
or even in the region of normal to rather bad adjustment. For instance,
recurrent very aggressive behavior toward peers often results in strong
reactions from involved parents, peers, and the teacher. These reactions
may have implications for the development of other person characteristics
of the child. The significance of the difference between very low and
medium habitual aggression may thus be very different from the signifi-
cance of the difference between medium and very high habitual aggression
with regard to the development of the whole adjustment spectrum.

    Secondly, the processes that lead to maladjustment may also be dif-
ferent both in kind and degree from those that lead to good or normal
adjustment. For instance, habitual, very aggressive behavior is the
central symptom for some children with conduct problems. The determi-
nants of such behavior are imperfectly understood, but it may well be
not just a question of 'more' of a set of negative circumstances also
present in the determination of normally aggressive behavior. The de-
velopment of inhibited nonaggressive behavior may also involve other
processes than the development of very aggressive behavior (see, for in-
stance, Bandura, 1973; Wiggins et al. 1976). Thus, there are reasons
to believe that aggressiveness in the region of 'low' to 'medium' can

have quite a different relationship to other psychological characteristics than aggressiveness in the region of 'medium' to 'high'. The problem of kind or degree has also been touched upon by Rutter (1981), and he gives an example concerning the development of criminality, which for the sake of brevity is not referred here.

In the following, two additional technical points are made with regard to methodological problems that may arise if complete adjustment scales are used in the study of maladjustment:

1. The most obvious set of problems are the methodological, technical problems introduced by non-linar relationships. For instance, in a Swedish study in our program, Zettergren (1979) found that boys with high peer status tended to fall in the *medium* range of aggressiveness as rated by the teacher. The difference between the mean aggression level of children with high peer status and children with medium peer status was negligible, but children with low peer status were more aggressive. In another study within the same program the results illustrated in Figure 1 were found with regard to the relationship between a child's peer status and his parents' positive or negative relations to each other.
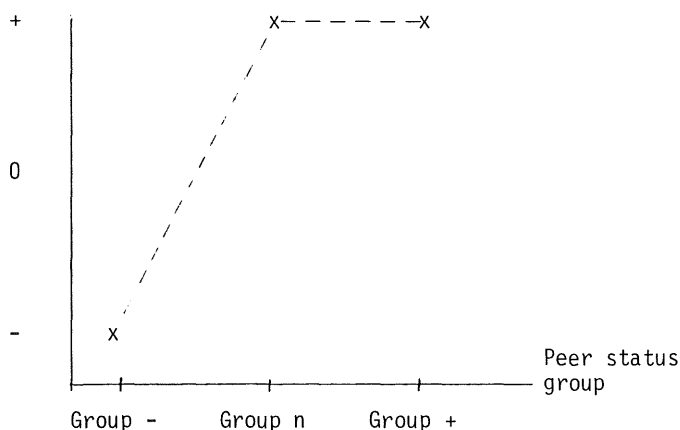
Relations between parents

Figure 1. Peer status and relations between parents.
(For details - see Magnusson, Dunér, & Zetterblom, 1975, p.240)

2. Consider next the study of the development of maladjustment.
Let us assume that one symptom we then want to study is the development
of aggressive behavior in boys, a subject that has been the focus of
much interest in recent years (see Olweus, 1979, for a review). As an
example, take a simple study of the stability over time of aggressive
behavior. Often correlations between measures taken at different points
in time for the same individuals are used as indicators of the degree
of stability, and these coefficients are often around 0.50 - 0.60, when
not corrected for attenuation. What does this say about the stability
over time of maladjusted, very aggressive behavior? If, for instance,
those who are very low on the aggressivity scale also are very stable in
this behavior, there need not be any stability at all in maladjusted,
very aggressive, behavior in order to achieve stability coefficients
around 0.50. Now we are not saying that this is the case but merely
pointing out that when *maladjustment* is the focus of the study only
statistics and scales should be used that are pertinent to the problem.

Perhaps it should be pointed out that the interactional standpoint
does not mean that we consider it necessary or even suitable to always
use all indicators of an individual's maladjustment in the same analysis.
Sometimes it is pefereable to use just a few variables, and the important
thing is that such a simple analysis fit into a larger plan of analysis
in which interactive relationships are taken into account.

(3) Systematic observation and description

The project is oriented toward systematic observation and descrip-
tion. This orientation has two reasons.

The first reason is that the broad scope of the project together
with the empirical aim of providing information about the prevalence
of maladjustment makes it very difficult to adopt a specific theoretical
orientation. Indeed, such an orientation would demand something of an
amalgamation of theoretical propositions in different research tradi-
tions such as developmental psychology, child psychiatry, and crimino-
logy. Apart from the obvious difficulty of such a task it would almost
certainly mean that a good deal of the available longitudinal informa-
tion would have to be poured down the drain, since it would not fit in
the theoretical model.

The second reason for emphasizing systematic empirical observation and description rather than theoretical formulations or the testing of hypotheses has to do with the present author's bias. We simply believe that careful empirical description (by all means guided by theories) often is an important and basic task both in its own right, and in order to form the solid basis for the formulation of effective theories.

The above should not be taken as indicating that this work will be a-theoretical. Theories and facts from several research traditions will also be the buildingstones of the structure of the description of mal-adjustment, as well as the background for its interpretation. The following statement by Cronbach (1975) expresses as well our orientation:

> "The goal of our work, I have argued here, is not to amass gene-
> ralizations atop which a theoretical tower can some day be erected..
> .. The special task of the social scientist in each generation is
> to pin down the contemporary facts." (p. 126)

EARLIER LONGITUDINAL RESEARCH

This review is not intended to be complete in the sense that all major longitudinal studies are presented and discussed. Our aim here is to review studies that are important for our planning or to provide a matrix for the interpretation of our results. Thus, methodological as well as substantial aspects will be of importance in the present connection.

Description of current longitudinal program

We start with a presentation of the longitudinal program on which the present project is based. The program is named 'Individual develop-ment and environment'. For more comprehensive information about this longitudinal program the reader is referred to Magnusson, Dunér, and Zetterblom (1975) or to Magnusson and Dunér (1981). Our presentation here serves the dual purpose of introducing the reader to some of the longitudinal data that are available to this project, and to some initi-al results which are important for planning purposes.

The main purpose of the longitudinal study was already from the be-
ginning a broad study of behavioral development in individuals from middle
childhood to adult age. Of special interest was the relation between
early maladjustment, and maladjustment at adult age, particularily as
it was reflected in alcohol abuse, criminality, and mental illness.

A cohort of approximately 1.000 pupils who were born in 1955 and
who were third-graders in the public school in Örebro during the school
year 1964-65 has been followed up to present (the *main* group). The sur-
vey also includes a *pilot* group consisting of the Örebro pupils who were
born in 1952 and who were sixth-graders in 1964-65; they also have been
followed into adulthood. Certain instrumental tests and pilot studies
have been and are being carried out on this group. A pilot study was
also made on pupils in Örebro who were eighth-graders in 1964-65, but
this group has not been followed up any further. Table 1 provides a
schematic illustration of the course of the project until 1975.

Table 1.   Survey of the project 1965-82.

Year	Pilot group born 1952		Main group born 1955
1965	Whole of grade 6 960 pupils		Whole of grade 3 1032 pupils
1966			Intensive survey of social relations, grade 4, 90 pupils
1968	Grade 9:	The educational and vocational choice process	Grade 6: Total group survey. The educational and vocational choice process
		Selfreported delinquency, boys	Medical examinations, random sample of 250 pupils
1969-70			Grade 8: The educational and vocational decision process. Norms and norms conflicts. Symptom load, girls. Ecological surveys. Intelligence measurement, standardized achievement tests. Ossification measurement, random sample. 250 pupils. Social relations

Table 1. Survey of the project 1965-82.   Continuation.

Year	Pilot group born 1952	Main group born 1955
1971	Grade 3, upper sec.: The educational and vocational choice process. Intelligence, creativity	Grade 9: Total group survey. Follow-up from 1965. The educational and vocational choice process. Self-reported delinquency, boys
1972	Post-sec.: Educational and vocational choice (technical line only)	Grade 1, upper sec.: Upper secondary school questionnaire. Transition to new type of school. Random sample of all school-leavers from Grade 1: interview
1973	Post-sec.: Employment and study conditions Postal questionnaire to former upper sec. students	Grade 2, upper sec.: Educational and vocational choices 2-yr-lines of upper sec. school. Values. Leisure occupations
1974		Grade 3, upper sec.: Educational and vocational choice. School experiences. Values. Leisure occupations. Anxiety, situation test Personality test
1975	Post-sec.: Employment and study conditions Pupils leaving school in 1968: Postal questionnaire	
1981		Post-sec.: Employment and study situation. Postal questionnaire
1982		Special study of medical sample with interviews, tests, and a medical examination

The data which have been collected for the studies may be classified into three groups:

(a) *Basic information* on total groups. Data have been collected on pupils at the ages of 10, 13, and 15 years, respectively, (grades 3, 6, and 8) for the following main areas using the following main methods for data collection:

Area	Method for data collection
Domestic background, domestic situation	Parental questionnaire
Intrinsic adjustment satisfaction etc.	Pupil questionnaire
Classmate relationships	Sociometric methods
Extrinsic adjustment: behavior in school	Teacher ratings
at home	Parental questionnaire
in society	Public records
Intelligence, knowledge	Tests and grades given on report cards
Attitudes and values	Semantic differential

(b) *Information concerning special problems* collected in the course of subprojects and applying to *total* groups, e.g.:

Area	Age	Method for data collection
Norms	15	Situation inventory
Symptoms (girls)	15	Questionnaire
Criminality (boys)	16	Questionnaire, self-reported delinquency
Study and vocational decisions	13-19	Questionnaires Semantic differential
Goals, values in life	18	Questionnaire

(Note that school start is at age 7. Grades 1-9 are in comprehensive school. In grade 3 most children are 10, in grade 6 they are 13, and in grad 9 they are 16. Upper secondary school (gymnasium) has three grades, the students are 17-19 years old.)

(c) *Information concerning special problems* collected in the course of subprojects and concerning random samples from the total group (used when expensive methods are necessary), e.g.:

Area	Age	Methods for data collection
Social relations (N=90)	10-12	Interview etc.
Biological variables (N=225)	13-15	EEG, hormone analysis, ossification measurements, physical achievement capacity
Drop-out problems	16-17	Interview, questionnaire

It is not meaningful to try to summarize all results so far in the longitudinal study with regard to adjustment variables. In the following, some results will be given which indicate the degree of stability of measures of maladjustment, and the relationship between early indicators of maladjustment and maladjustment at age 16.

As was pointed out earlier, stability coefficients are of limited value in the present connection, and such results will not be presented.

The relation between timidity and adjustment has been studied by Hencz and Jansson (1974). They defined as timid children who had a rating of at least 5 on a 7-points scale of timidity as rated by their teachers. At age 10, this was the case for 93 boys (23%) and 119 girls (27%). At age 13, 39 boys and 43 girls were still rated as timid, i.e., 42% of the boys and 36% av the girls that were timid at age 10 were stable in this respect. At age 10, timidity was associated, although not very strongly, with bad peer relations and with some conduct problems such as distraction with regard to school work and lack of school motivation (both behaviors rated by teachers). Timidity was also associated with tenseness (overambition) and disharmony as rated by the teachers. No strong association was found with the childrens' self-reported adjustment. To some extent timid girls were underachievers at age 10. Timidity at age 10 was associated with various adjustment problems for girls at age 15-16, and these problems were more pronounced for those who were timid also at age 13. For instance, they had lower schoolmarks in their mother tongue, lower peer status, and lower self-evaluated adjustment and peer status. For boys, only tendencies were found in this direction.

Sillén (1972) studied the relationship between hyperactivity and adjustment for boys. She defined as 'hyperactive' boys who had a standardized score of at least Z=0 .80 on a hyperactivity scale. This was the case for 97 out of 413 boys (23%). 46 boys of these were still rated so at age 13, i.e., 47% were stable in this behavior between age 10 and 13. At age 10 it was found that hyperactivity was related to various conduct problems such as aggression and lack of school motivation, and this relationship continued at age 13, and at age 15-16 for boys with stable hyperactivity. At the ages 10 and 13, but not at age 15-16, boys with stable hyperactivity had lower peer status. The same tendency was found for self-evaluated adjustment.

Broman (1974) studied children with very low peer status at age 10 (rejected children). Rejected children numbered 54 boys (11%) and 48 girls (10%). At age 13, 44% of the rejected boys were still classed as rejected, the corresponding figure for girls was 46%. At age 15, 75% of those who were rejected at both age 10 and 13 still had a very low peer status (this was true for both boys and girls). Boys and girls who were rejected both at age 10 and 13 had a low self-esteem and various conduct problems. The girls also often stated they did not like school.

Stattin (1979) studied the development of relative achievement from age 10 to age 16 for children characterized by different degrees of delinquent behavior at age 16. He found that those criminally active at age 16 had a negative development of relative achievement through school. Already at age 10 did they underachieve, and this problem was aggravated when they grew older.

Söderberg (1976) attempted to predict adjustment at age 15-16 from adjustment at age 10 and 13. He used both an extreme group design and a regression analytical design, but the relationships he found were usually very weak. This may have depended on his reliance on either a single variable approach, where relationships were studied for one or only a few variables at a time, or a regression analytical approach with no provision for interactional effects. With the extreme groups design he found that conduct problems for girls at age 10 were among the few variables having predictive power for a composite adjustment variable at age 15-16.

Söderberg also used a stepwise regression analytical procedure to study how adjustment for girls at age 15 could be predicted from adjustment at age 10 or 13, and he found some significant relationships, although rather weak. The dependent variables were taken from a personality inventory (factor scores). 'Asociality' was predicted to some extent by 'lack of school motivation', and by 'parents' education', both variables from age 10. 'Psychosomatic reaction' was predicted to some

extent from 'psychosomatic reaction' and 'IQ' at age 10. 'Anxiety was predicted to some extent from 'school adjustment' (self-stated) at age 10 and 'motor disturbance' at age 13. As Söderberg points out, the reliability of many of the variables he used are either low or moderate which naturally attenuates the relationships.

From our viewpoint his study has certain limitations, mainly a negligence of interactional relationships and syndromes. However, since he recognized the importance of measuring maladjustment rather than adjustment we found his study useful. It also gives, something of a background and the lack of strong, simple, relationships is an intriguing starting point for a more sophisticated, interactional, study.

One analysis which is interactional to some extent has already been performed on this data for boys (Dunér, 1976). He grouped the boys at age 10 in adjustment syndromes by means of latent profile analysis (Lazarsfeld & Henry, 1968; Magnusson, Dunér, & Zetterblom, 1975; Mårdberg, 1967). In this analysis three adjustment patterns were distinguished:
(a) boys badly adjusted with regard to both extrinsic and intrinsic adjustment with emphasis on conduct problems,
(b) a mixed group of boys with timidity and lack of school motivation as central symptoms,
(c) well adjusted boys.

The adjustment at age 15-16 was then studied for the three groups of boys, and as expected it was found that Group (a) had lower means in all measures of adjustment than Group (c) - both with regard to intrinsic and with regard to extrinsic adjustment. Most of these differences were significant. The largest differences were found for asociality-criminality and for peer relations. He also found that Group (a) - children at age 16 had worse relations to adults (self-stated) than Group (b)- or (c)-children. It should be observed that Dunér's aim was to study *adjustment*, not maladjustment. This had implications

for his research design which make the results less useful to us. Among
other things his classification of the boys cannot be presumed to give
syndromes of *maladjustment* (see the previous discussion in the section
'theoretical perspectives'). Nevertheless, his results point to the
fact that stronger relationships over time might be expected when syn-
dromes are used as independent variables rather than single variables,
as in Söderberg's study.

Other Swedish longitudinal studies

Several longitudinal Swedish studies have been performed in which
psychological development is investigated. Usually, the sample sizes are
large, and great care has been taken to obtain representative samples.
In our opinion, most Swedish studies are in this respect superior to
most American studies.

There is only one study, except ours, which from a pscyhological
viewpoint contains developmental data covering most aspects of malad-
justment, and that is a study of 212 children from a suburb of Stockholm
(Karlberg et al, 1968). The children were followed from their birth to
age 18 with regard to both physical and psychological development.
A wide range of information that relates to adjustment has been col-
lected at several points in time. Many publications have resulted from
this project, but we have only found one publication by Klackenberg
(1969) that deals with the development of maladjustment. He studied
changes in the development of psychiatric symptoms between the ages 4
and 7. If possible, we may attempt to cross-validate some of our find-
ings on this sample in the future.

Andersson (1969) studied the development of adjustment, as expres-
sed by the child, in grades 8 and 9. However, he was primarily interes-
ted in developmental shifts at a group level, not individual development.
He concluded that his results did not allow of any general conclusions
on whether feeling of well-being at school and degree of adjustment
had increased or decreased.

In a large sociological longitudinal project (Project Metropolitan),
Janson (1981a) has followed all children born in 1953 and living in the
Stockholm area in 1963 (N=15.117). The collected data include delivery
records, various information about the parents (including criminal re-
cord of family head, family income, social class), school marks, way
through the school system, draft board data (boys), police records and
social register data. Great care has been taken to avoid both partial
and total drop out, and this very large and representative Stockholm
cohort is a great asset also from a psychological point of view, especi-
ally with regard to the study of low-frequency phenomena. Studies with-
in the Metropolitan project which are pertinent to us are, for instance,
the development of a longitudinal model of juvenile delinquency. Origi-
nally, Project Metropolitan was planned to have sister projects in the
other Scandinavian capitals, but for various reasons only a Danish study
of a Copenhagen cohort was implemented.

Results from other Swedish longitudinal studies will of course be
of value to us, especially with regard to the anchoring of some vari-
ables, but these studies will be introduced in the appropriate context,
and will not be reviewed here.

Other longitudinal studies

We are primarily interested in longitudinal studies of maladjust-
ment with fairly large samples, and which are reasonably representative
of a general population. This excludes the vast majority of studies,
which from our point of view suffer from serious defects in sampling,
and often also with regard to measurement (for a review, see Wall &
Williams, 1970).

In the following a few longitudinal studies will be reviewed which
cover broad aspects of adjustment/maladjustment and/or exemplify inte-
resting methodological or research strategic principles. Results from
many other studies will of course be of use to us, but these will be
presented in the appropriate context.

In a large British longitudinal study (N=5.362), children born in 1946 were followed from birth to adult age (Atkins et al, 1981). Great care was taken to obtain a representative sample, and information was collected with regard to both physical and psychological development. Information relevant to the study of maladjustment was collected at several points in time. During the school years this information was mostly collected from teachers and parents, and at adult age from the participants themselves.

Results from this study illustrate the fact that several negative events before school age have important implications for later maladjustment. For instance, Douglas (1975) found that hospital admissions between the ages 0:6 and 3:6 were related at age 13 and 15 to troublesome (but not nervous) behavior in school, according to teachers' ratings, and to low reading scores at age 15. Wadsworth (1979) found that a broken home before the age of 4 was significantly associated with later delinquency in boys. A study by Douglas et al (1968) indicated that only for children with a syndrome of maladjustment at age 15 with regard to conduct problems and personality problems, did a progressive deterioration of test performance occur during the school years. They also studied the validity and reliability of teachers' ratings, both experimentally and by comparing the ratings with information from the children's mothers. They concluded that teachers' ratings was a very useful research instrument.

A British study similar to the one reviewed above has been carried out with about 17.000 children born in 1958 (Fogelman & Wedge, 1981). A wide range of studies have been performed on data from the project such as a longitudinal analysis of social factors associated with changes in educational attainment (Fogelman & Goldstein, 1976), and studies of longitudinal patterns of behavior at home and at school (in progress).

In 1964-65 the Isle of Wight studies were initiated (Rutter et al, 1970). The aim was to study educational, psychiatric, and physical disorders in children aged 9 to 11 years. One aim was to provide epdiemiological information about various disorders, and mass screening methods

were applied to a population of 3.500 children to pick out children
having one or more handicaps or disorders. All children selected in
this way, and a control group, were then individually examined (about
1.000 children).

At age 14-15 the Isle of Wight children with some kind of handicap
or disorder were followed up, and a new cross-sectional study was applied
to the whole population. It was found that 8% showed a handicapping
psychiatric disorder (Graham & Rutter, 1973), a figure that was slightly
higher than the figure when the children in the population were aged 10-
11. Children with conduct disorders fared worst - 3/4 of them still had
a disorder at age 14-15 (mostly a conduct disorder but in quite a few
cases an emotional disorder). The prognosis for a child with an emotio-
nal disorder at age 10-11 was better than for a child with a conduct dis-
order, but nearly half still had problems in adolescence although not con-
duct problems. As usual in this field, large sex differences were found
with the incidence of disorder being twice as high for boys depending
on their much higher rate of conduct disorders.

A study comparable to the above involved children aged 10, and
attending state schools in Inner London (Rutter et al, 1976). It was
found that for this sample behavioral deviance, and psychiatric dis-
order wer about twice as common as in the Isle of Wight sample.

An interesting methodological approach has been used by Block (1971)
when studying longitudinal patterns of personality development from
early adolescence to adulthood. He started by pooling school age data
from two different longitudinal studies in order to imporve the repre-
sentativeness of the data. Then he collected new data for those in
his sample from adulthood by means of extensive interviewing and testing.

Block used a Q-sort multiple-judge rating procedure to obtain com-
parable data for persons belonging to different original samples, and
for measurements taken at different points in time with different instru-
ments. The Q-set consisted of a set of personality-descriptive state-
ments, and for a given individual each judge ordered the statements in

a specified set of categories according to how well each statement fit-
ted the person. Naturally, they had access to all information about
the person to be judged.

This approach is ideographic in the sense that each person was com-
pared to himself with regard to the relative degree he exhibits different
personality characteristics, but the results can be treated in a norma-
tive way as shown by Block.

Out of his large result section two important items chould be men-
tioned: (i) Block found that some individuals are changers with regard
to personality characteristics, and others are not, and (ii) male
changers between junior and senior high school tended to have what we
call internal adjustment problems, (this was not true for female changers).

THE PROBLEM OF A TAXONOMY OF MALADJUSTMENT

Empirical studies

Maladjustment has been studied within different research traditions,
and the study has been focused on very different aspcets of maladjustment.

Using a *psychiatric perspective* various aspects of maladjustment
have been studied. Often pupils' qustionnaires or teachers' ratings have
been used as screening instruments, and children indicated by these instru-
ments as having problems have been subjected to an intensive follow-up
ening in a psychiatric classification. This approach was, for instance,
used in the earlier mentioned longitudinal study by Rutter (1981). In
this case one aim was a general epidemiological description, but in other
cases the aim may be, for instance, the classification of individuals at
risk for schizophrenia (Lewing, Watt, & Grubb, 1981).

Rutter (1978, 1981) concluded from his own studies, and from those
of others, that longitudinal studies have validated the differentiation
between the long term indications of conduct disorders and emotional

disturbances, respectively. Emotional disorders have been shown to have
a much better prognosis (cf. the previous section). Rutter finds it
questionable whether there are valid distinctions within the broad con-
duct disorder and emotional disorder groupings. With valid distinctions
he means that there are meaningful differences in the relationship to
other variables between categories, especially with regard to prognosis.

Rutter discussed a finding by Jenkins et al (1977) where they showed
that delinquents with a 'socialized disorder' had a better prognosis than
delinquents with other kinds of disorders. He made the interesting point
that it is uncertain whether the finding reflects a distinction between
syndromes or rather depends on different levels of intensity for vari-
ables present in all children. Is it a difference in type or in degree
which explains the differences noted in prognosis between the psychiat-
ric groupings?

Lindholm and Touliatos (1981) studied the development of behavioral
problems using a cross-sectional design covering the age span from kinder-
garten to the eighth grade. They used the Quay Behavior Problem Check-
list in which five types of behavioral problems are scored, based on
teachers' ratings, The five scales include 'conduct problems' and 'per-
sonality problmes'. It was found that 'conduct problems' and 'persona-
lity problems' increased from kindergarten to the third grade, declined
from the third to the sixth grade, and then levelled off from the sixth
through eighth grade. Boys experienced more behavior problem than girls,
and children coming from homes with a low SES were more maladjusted than
children coming from homes with a high SES.

The decline in behavioral problems which Lindholm and Touliatos
found between middle childhood and adolescence is not consistent with,
e.g., Rutter's findings. This may depend on cultural differences, but
may also depend on biased sampling. It is possible that the drop out
at adolescence was more biased with regard to behavior problems than the
drop out at earlier ages and due to the cross-sectional design this may
have introduced systematic errors in the comparison between ages.

An epidemiological study of health and adjustment at the age of 10 was carried out by Mellbin, Sundelin & Vuille (1982) using a large Swedish sample of residents in Uppsala kommun (N=5.491) Specially trained nurses interviewed school health nurses and teachers. For a subsample of the children, data were also available from a medical check-up at age 4. They used the following grouping of childrens' health and adjustment problems:

- Health problems (13 indicators)
- Sensoric problems, speech problems, and mental retardation (4 indicators)
- Achievement problems (6 indicators)
- Psychological and social problems ('Aggression'. 'Anxiety', ' 'Concentration problems', 'Dependence'. 'Peer problems', 'Other behavior problems', and 'Social problems in the family'.

Although the psychological data are somewhat crude, many interesting facts were reported from this study. As is usually found, boys were more often reported having problems at age 10 almost regardless of the area investigated. Reading difficulties were reported for 7% of the boys and 2.5% of the girls. According to the teachers and school health nurses, the boys had adjustment problems ('medium difficult' or 'difficult') with the following prevalences (figures for girls within brackets): 'Aggression' 4.8% (1.3%), 'Anxiety' 3.7% (1.9%), 'Concentration problems' 9.2% (2.8%), 'Peer problems' 1.8% (1.0%). The figures for 'Peer problems' is surprisingly low, but this may partly depend on the fact that the school health nurses' rating is one component in the construction of the maladjustment variables, and they sometimes did not know about the children's peer problems (this line of reasoning also may apply to the other maladjustment variables).

When data at age 4 were related to data at age 10, it was found that the stability was fairly low for 'Lanquage difficulties' and 'Motoric difficulties'. Also for maladjustment variables such as 'Aggression' and 'Anxiety', the predictive power was not high. For instance, only 28.4% of the children who were judged by the physician to be anxious at age 4 were rated as anxious at age 10, 19.1% of the children who were rated as anxious at age 10 were also anxious at age 4. However, the fairly low

stability indicated by these figures may partly depend on the somewhat
crude measures. These measures also differed for the different ages.
That a higher stability is found for 'Anxiety' than for 'Aggression'
is somewhat contradictory to findings for older children where con-
duct problems exhibit a higher degree of stability than personality
problems. Perhaps this reflects a genuine difference between different
stages of development. Another possibility is that the measures of
aggression at the different ages were not sufficiently comparable.
At age 4 the main source of information was the parents, and at age 10
the main source of information was ratings by the teachers and school
health nurses.

Achenbach and Edelbrock (1978) have reviewed studies concerned with
the classification of childhood psychpoathology. They conclude that
four syndromes of psychopathology are well documented, namely, 'Aggres-
sion', 'Delinquency', 'Hyperactivity', and 'Schizophrenia'. Another
four syndromes have empirical support, namely, 'Anxiety'. 'Depression',
'Social withdrawal', and 'Somatic complaints'. Apparently they are
more optimistic than Rutter about the usefulness of finer categories,
but this may depend on Rutter's orientation towards a longitudinal per-
spective, where the prognostic value of the syndromes is at the focal
point.

Large sex differences are found with regard to childhood psycho-
pathology, and without going into details we summarize that conduct
problems are much more common in boys than in girls. Before adolescence
personality problems are also more common for boys than for girls (Eme,
1979). This it is important to study the sexes separately in this area.

Quay and Quay (1965) studied behavior problems, as rated by the
teachers, during early adolescence. Using factor analysis they found
three main factors, namely 'Conduct problems', 'Personality problems',
and 'Immaturity'. It thus appears that the broad categories or syn-
dromes of conduct problems and personality problems are well supported
by empirical findings. These two syndromes correspond rather well to the

concepts of 'extrinsic' and 'intrinsic' adjustment which were central in the planning of the longitudinal study the present project is based on (Magnusson, Dunér, & Zetterblom, 1975).

Leaving the field of psychopathology, a vast number of studies have been performed with regard to other kinds of maladjustment such as specific reading disability, underachievement, truancy, delinquency and so on. We have not been able to locate any systematic attempt to provide a taxonomy for the whole field of maladjustment; one reason for this being that normally only a specific area of maladjustment is the focus of a single study.

Environmental aspects

In an interactional model for behavior, the environment, "as it really is" and as it is perceived and assigned meaning to by the individual, plays an important role. This makes some comments on the environmental frame of reference for the present study necessary.

Maladjusted behavior takes place in actual situations. Each situation is characterized by physical properties, possible social relations, cultural norms, rules and roles, and situation's biological and psychological meaning for the individual (see Magnusson, 1981). The main physical environments that are of specific interest in this study, where attention is directed to maladjustment during childhood and early adolescence, are the following:

1. The classroom
2. The school yard
3. The dining hall
4. The way to and from school
5. The home
6. Leisure time environments.

The school system in Sweden offers all children the same general school environment. In the community where the present study was carried out there are no private schools; all children attend the same

Table 2. Outline of a taxonomy of maladjustment.

EXTRINSIC MALADJUSTMENT

Conduct problems

Hyperactivity
Aggressive behavior
Generally disturbing/disobedience
Major breaks of rules (habitual truancy, delinquency)
Abuse of alcohol, drugs, etc.

Other kinds of extrinsic maladjustment

Lacks of concentration
Low school motivation
Underachievement

Poor social relations

Poor relations to parents
Poor relations to other adults
Poor peer relations, mobbing
Poor peer relations, rejection

INTRINSIC MALADJUSTMENT

The child's own experience of misery

Doesn't like the school work
Doesn't like school generally
Anxiety/stress in schoolwork
Anxiety/stress outside schoolwork
Pscyhosomatic reactions
Feelings of unhappiness at home
Other personality problems

The child's experience of negative evaluations

Low self-esteem
Feelings of low peer status
Feelings of being negatively viewed by teachers
Feelings of being negatively viewed by the parents

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The school system in Sweden offers all children the same general school environment. In the community where the present study was carried out there are no private schools; all children attend the same

school system. On one hand, this circumstance allows the study of individual development under what might be called 'standardized' environmental conditions at a very general level. On the other hand, it also implies that the effect on maladjustment of school characteristics of the kind studied by, for instance, Rutter (1979) and reported in his "15.000 hours" cannot be studied since the differences are small between the schools studied in the present project (Nygren, 1969).

The empirical part of this longitudinal project takes its start at the age of ten for a representative sample of Swedish boys and girls. It is natural then that the main part of the data during childhood and early adolescence have been collected at school. During that period of life, the school, and school related activities, also are important and in many cases predominant aspects of the individual's environment.

The fact that data for relevant behaviors, experiences, and social relations have been *collected* at school does not mean that they refer only to the school environment. Data also cover important aspects of behaviors and social relations outside the school system such as relations to parents and other adults, alcohol and drug abuse, criminal behavior, and norms and norm conflicts.

The environment influences individual behavior at different levels of generality, from the macrolevel characterized by cultural norms, rules, habits etc that are common to most members of the society and rather stable across situations and permanent in time, to the microlevel characterized by single stimuli and events, that are bound to specific temporary situations (see, e.g., Magnusson, Dunér, & Zetterblom, 1975). In the present project, behavior has not been studied with reference to specific types of situations with a few exceptions. Thus, the environmental factors which will be systematically related to individual maladjustment are at a higher level of generality and cover more permanent and broader aspects, such as the socioeconomic standard of the family, parents' education, 'family climate', separation between parents, frequent changes of place to live, etc.

A tentative taxonomy of maladjustment

Maladjustment is not an unambiguous concept with a clearly defined
content and distinct boundaries to other kinds of individual functioning.
It is multidimensional and its boundaries are to some extent arbitrarily
defined. Therefore we have to specify in each case which kinds of indi-
vidual characteristics that we include when operationalizing the concept
in empirical research.

One of the main aims of the present longitudinal project was from
the beginning the systematic study of the environmental and person factors
that contribute to the development of maladjustment. This aim has been
a steering factor in the planning and carrying through of the project,
among other things in the choice of person and environmntal factors to be
covered by data. At each stage of individual development those factors
which have been judged to cover main aspects of adjustment and those
which may be of particular importance for further adjustment have been
studied as far as resources and practical opportunities have permitted.

The aspects of maladjustment that we can study in the present project
are then determined by the types of data that have been collected at differ-
ent age stages, with their potentialities and limitations. Thus we do not
investigate maladjustment in an absolute sense; important aspects that
may follow from some other definitions of maladjustment may be uncovered
by our approach. We need a taxonomy which enables us to provide a bird's
eye view of maladjustment, and to find central indicators.

The aspects of maladjustment that we have chosen to elucidate are
presented in Table 2. The taxonomy applies to the period from middle
childhood to early adolescence. As follows from the comments made above,
this taxonomy is to some extent arbitrary; specific variables could have
been included, etc. The taxonomy has been made up for the specific pur-
pose of this project; to study individual development of maladjustment
We believe that it meets the necessary requirement for such a study.
However, it should be observed that it has not been made up to be used

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Other personality problems

The child's experience of negative evaluations

Low self-esteem
Feelings of low peer status
Feelings of being negatively viewed by teachers
Feelings of being negatively viewed by the parents

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for other purposes, for example, for psychiatric classification and di-
agnosis. It should be observed that we have focused on covering major
single aspects or symptoms of maladjustment as a basis for the construc-
tion of syndromes.

In Table 2 a major distinction is made between extrinsic and intrin-
sic maladjustment. Extrinsic maladjustment means a disagreement between
the child's behavior and the demands that define his role in she system.
Intrinsic maladjustment means disagreement between the child's needs,
motives, and evaluation on the one hand, and on the other the rewards
he gains as experienced by himself (Magnusson, Dunér, & Zetterblom, 1975).
This distinction agrees rather well with the one made by Rutter between
conduct problems and personality problems - a distinction which is well
documented (see above).

The distinction made between conduct problems and other kinds of extrin-
sic maladjustment is with regard to whether the formal or informal set of
rules in society are broken or not. This distinction is very basic in
most situations both inside and outside school, and is therefore natural
to make. The various kinds of conduct problems that are listed have
emerged from our review of the litterature, and from a common sense ana-
lysis. Both underachievement (see, for instance, Svensson, 1971) and
poor social relations (see, for instance, Roff et al., 1971) are impor-
tant aspects of maladjustment. The distinction between mobbing and rejec-
tion is central, and perhaps rejection should also be subdivided into
passive and active rejection with passive rejection meaning that a child
is not liked by anyone, but not disliked, and active rejection meaning
that a child is disliked by his peers (cf. Broman, 1974; Jennings, 1950).
However, for the sake of simplicity we do not pursue this distinction, and,
besides, passive rejection cannot unequivocally be categorzed as extrin-
sic maladjustment.

To obtain a meaningful classification of intrinsic maladjustment is
very difficult (see Lorr et al, 1963, for a discussion of the problems
of psychiatric classification). Several ways of arriving at a classifi-
cation are possible but none appears quite satisfactory to us. We make

a basic distinction between the child's experience of misery in differ-
ent situations, and the child's negative evaluation of himself, and
his beliefs of others' negative evaluation of him. From a situational
point of view we try to distinguish between what happens within and out-
side of the classroom and inside or outside school. With regard to per-
sonality problems, our review of the litterature suggests that anxiety
and psychosomatic reactions are commonly identified problems (see above)
and are thus included. Since we do not intend to make a psychiatric
classification, all other personality problems of an intrinsic maladjust-
ment type are lumped together in one category. Besides, in our opinion
a finer distinction within this area has not sufficient empirical support.

With regard to a child's experience of negative evaluations, a basic
distinction is between his own negative self-evaluation, and his belief
that others hold a negative evaluation of him. Especially important
persons are here his peers, his teachers, and his parents. The impor-
tance of this set of cognitive pictures with regard to maladjustment is
obvious (see, for instance, Diggy, 1966; Hall & Lindzey, 1957; Rogers,
1965). The child's evaluation can of course refer to specific aspects
of himself, and a global evaluation is rather crude (see, for instance,
Magnusson, 1964). However, it is sufficient for our purposes.

The actual problems involved in finding good indicators for our
constructs will not be treated in this report. Such problems are very
close to the data, and will be discussed in later reports when the data
from each point in time are analyzed. Certain methodological problems,
with regard to the construction of indicators, will be treated in the
following section.

METHODOLOGICAL CONSIDERATIONS

The construction of indicators of maladjustment

It is our belief that indicators having a direct relation to relevant behavior are preferable to elaborated indices for a number of reasons. For instance, complicated, relative measures have been shown to introduce complications when studying change (see the discussion in a later section). The descriptive focus of the project also gives additional importance to having indicators with an immediate psychologal interpretation.

Easy psychological interpretability of indicators also has implictions for the choice of scale values or cut off points. Rather than just trying to get fixed percentages of the distribution for a variable alloted to different categories of the indicator, it must also be the aim in research of this nature that a value on the scale of an indicator, should have a direct psychological interpretability.

In an earlier section of this paper it was argued that the scales to be developed should measure symptoms of maladjustment, and need not be constructed with the additional aim of discriminating between different degrees of good adjustment. Considering the imperfect reliability and validity of available measures, it appears not to be useful to attempt to discriminate between more than a few degrees of severity of symptoms of maladjustment. Such a coarse categorization is also necessary to be able to perform the rather down-to-earth kind of analysis we intend to do (see the next section).

The special problems introduced by errors of measurement are discussed in the concluding section with regard to the study of syndromes of maladjustment. The main practical implication of this discussion with regard to the construction of indicators is to avoid, if possible, to rely on a single scale or variable to measure a construct. To use several sources of information to measure a construct also increases the possibility of an acceptable situational coverage.

The detection of syndromes of maladjustment

As was discussed in the second section of this paper, one of our central interests is the grouping of persons into different syndromes of maladjustment rather than merely the grouping of variables.

There exists a multitude of methods for the detection of syndromes ranging from rather robust forms of cluster analysis (see, for instance, Bijnen, 1973) to the analysis of latent structures (see, for instance, Lazarsfeld, 1968). In some situations, such methods will be used by us, but we would normally prefer a methodology which allows us to stay closer to the data than we are able to in latent structure analysis. Ideally, we would like to study the maladjustment pattern in all indicators for all individuals. If we are willing to reduce the number of indicators to, say 8 - 10, each taking a maximum of two or three values, there are methods available to structure and analyze such data. Furthermore, in these methods few assumptions are made - they are robust.

The data to be analyzed is of a k-dimensional categorical type and can be represented by the data matrix in Table 3.

Table 3. Data matrix for k-dimensional categorial data.

| Person nr | Variable nr | | | | | |
	1	2	3 , , , , , k			
1	X_{11}	X_{12}	X_{13}	, , ,	X_{1k}	
2	X_{21}	X_{22}	X_{23}	, , ,	X_{2k}	
3	X_{31}	X_{32}	X_{33}	, , ,	X_{3k}	
,	,	,	,	, , ,	,	
,	,	,	,	, , ,	,	
,	,	,	,	, , ,	,	
n	X_{n1}	X_{n2}	X_{n3}		X_{nk}	

Let us denote the number of possible values or categories for variable able i with the letter combination C_i. The number of possible profiles or combinations of values in the k variables are $C_1 \cdot C_2 \cdot C_3 \cdot \ldots \cdot C_k$, and it is easily seen that already for a moderate number of variables, each taking on a few different values, the number of possible combinations is very large. For instance, ten variables each taking on three values gives 59.049 different combinations. To be able to stay close to data, and manage to overview and structure data, the number of indicators, and the number of values these take on, must be limited.

Krauth & Lienert (1973) have developed a method for analyzing k-dimensional categorial data in order to detect syndromes ('Konfigurations-frequenzanalyze' or 'KFA'). Their method consists in essence of a systematic analysis of response patterns using χ^2-based statistics. The observed frequencies of all possible response patterns are compared to the expected frequencies, under the null hypothesis of independence between the k variables. A significant excess frequency of an observed pattern indicates a 'Konfigurationstype', and a significantly lower frequency of an observed pattern than expected indicates a 'Konfigurationsantitype'. The method has been developed to incorporate hierarchical analysis and the study of pattern change.

In our opinion, Kraut & Lienert's method is very useful in many situations. However, certain problems arise when using it in the present context - one problem being the very small expected frequencies for many patterns which may invalidate the significance testing procedures. There are, however, ways of getting around this problem such as devising other tests of significance (cf. Krauth & Lienert, 1982) and as grouping variables before testing.

Another way of analyzing k-dimensional categorial data is using log-linear models (see, for instance, Bishop, Fienberg, & Holland, 1975). There it is assumed that the probability of an occurrence in each cell in the k-dimensional table can be represented as a product of a number of latent parameters which indicate the existing interactions between the k variables.and the single effects. If the logarithms are taken of the cell probabilities,

these then become linear functions of the parameters, which can be in-
terpreted as in an analysis of variance situation. Different models
can be tested by assuming different parameters to be zero.

Also in the case of log-linear models problems are introduced by
small expected frequencies, and the model is more complicated than 'KFA'.
With many variables empty cells will appear which introduce complica-
tions. However, log-linear analysis is a powerful tool for testing
models, i.e., in our case detected syndromes, and will be used in some
situations for confirmatory analysis.

To illustrate the methodology mentioned above the following example
is given in Table 4, using data from the present project.

Table 4. An example of 3-dimensional categorial data taken from boys
aged 10 in the project.

| | | Timidity | |
		Yes	No
Aggressive	Hyperactivity	5	33
	No hyperactivity	3	20
Not aggressive	Hyperactivity	8	49
	No hyperactivity	64	290

The expected frequency of each cell under the null hypothesis of
complete independence of the three variables is given in Table 5.

Table 5. Expected frequencies for the cells in Table 4.

| | | Timidity | |
		Yes	No
Aggressive	Hyperactivity	2.1	10.2
	No hyperactivity	8.3	40.5
Not aggressive	Hyperactivity	14.0	68.7
	No hyperactivity	55.6	272.6

An overall χ^2 for testing independence computed for Table 4 is 79.3 with 4 degrees of freedom (p< .0001). In a 'KFA' analysis a χ^2 component is calculated for each cell, and the value is compared to the χ^2 distribution with one degree of freedom. The value of each component is given in Table 6.

Table 6. Values of χ^2 components in a 'KFA' analysis of Table 4.

| | | Timidity | |
		Yes	No
Aggressive	Hyperactivity	4.0*	51.0***
	No hyperactivity	3.4	10.4**
Not aggressive	Hyperactivity	2.6	5.6*
	No hyperactivity	1.3	1.1

* = p< .05

** = p< .01

*** = p< .001

To handle the problem of dependence between the different χ^2-compo- nent-tests, Krauth & Lienert suggest that each of the tests are performed with a type I error level that equals the desired level divided by the number of tests. If in our case the desired α is 5%, then each test should be performed on the 5/8% level. We then find that Aggression x Hyperac- tivity x No timidity constitutes a significant type, and that Aggression x No hyperactivity x No timidity constitutes a significant antitype.

A log-linear approach was also performed on the same data, and the fit of four different such models are given in Table 7. A small χ^2 indi- cates a good fit.

The first model, denoted (A) (H) (T), implies that there are no interaction effects between the variables and the second model indicates that in addition to the main effects of all three variables, there is an interaction effect between Aggression and Timidity. The third model,

Table 7. The fit of four different log-linear models to the data in
Table 4.

Model	χ^2	df
(A) (H) (T)	63.7***	4
(AT) (H)	62.9***	3
(HT) (A)	62.7***	3
(AH) (T)	1.4	3

denoted (HT) (A), implies that in addition to the single effects of all
three variables there is an interaction effect between Hyperactivity and
Timidity. The fourth model, denoted (AH) (T), implies that in addition
to the single effects there is an interaction effect between Aggression
and Hyperactivity. It is seen from Table 7 that the fit of the three
first models is not acceptable, but that the fourth model fits the data
well. The interpretation is similar, but not identical to the one reached
after the KFA-analysis. From both analyses it is concluded that there
is an interaction effect between Aggression and Hyperactivity, but in
the KFA the interpretation also calls for an interaction of Aggression
x Hyperactivity with Timidity. This variable is a linear effect in the
log-linear analysis, which gives a somewhat simpler interpretation.

In our opinion, the KFA has a great heuristic value in being simple
to perform and it allows us to stay close to data. However, we believe
that in some situations it is advantageous to use both methods.

In situations when many variables must be included in the analysis
it may not be meaningful to apply the above kinds of analyses. A robust
form of cluster analysis is then an alternative where the similarity be-
tween objects is measured with, e.g., the agreement score of McQuitty
(see Bijnen, 1973, for a discussion of this).

Additional problems are introduced by the presence of errors of mea-
surement. These are discussed in the last section where a method ("the
type-leader method") is suggested for handling such problems.

When grouping individuals using information from many variables, problems almost always arise not only with regard to how many clusters to retain and how to allot objects to different clusters or types. Problems arise also with regard to the psychological interpretation and description of the types that are circumscribed. One method to guide both the grouping of individuals and the structuring of the different maladjustment syndromes of indicators is to use a two step procedure in which the first step is to find syndromes *within* the main areas. One possible division into areas would be to divide the indicators in two broad groups, namely those measuring extrinsic maladjustment and those measuring intrinsic maladjustment. Then the syndromes within each area are related to syndromes in the other area in a cross-tabulation. The resulting classification of syndromes or patterns of maladjustment would then have the appearance illustrated in Table 8. For illustrative purposes it is assumed that three syndromes are found within each syndrome area.

Table 8. Example of a possible result structure for patterns of maladjustment.

Syndrome found with regard to intrinsic maladjustment	Syndrome found with regard to extrinsic maladjustment			
	Syndrome 1	Syndrome 2	Syndrome 3	No extrinsic maladjustment
Syndrome 1	n_{11}	n_{12}	n_{13}	n_{14}
Syndrome 2	n_{21}	n_{22}	n_{23}	n_{24}
Syndrome 3	n_{31}	n_{32}	n_{33}	n_{34}
No intrinsic maladjustment	n_{41}	n_{42}	n_{43}	n_{44}

In Table 8, for example, n_{23} means the number of persons exhibiting Syndrome 2 with regard to intrinsic maladjustment and Syndrome 3 with regard to extrinsic maladjustment. In practice, presumably more than three syndromes are necessary within each syndrome area, and with, for instance, five syndromes within each area the number of cells become 36. The results may then be somewhat difficult to overview, but we think it

is nevertheless important to present such results since they are rather close to the actual response patterns. On the basis of results like those in Table 8, a simpler description can then be given.

It may be that it is found that the subdivision of the indicators into the two areas suggested here, oversimplifies and that it is necessary to divide the indicators into more than two areas. This is fully possible, but there are also obvious limitations to the number of cells and/or dimensions that are possible to handle.

A longitudinal approach for studying the development of patterns of maladjustment

Some design problems. The development of psychological characteristics has been studied using both longitudinal and cross-sectional designs, and it has been shown that both designs have their strengths and weaknesses (see, for instance, Baltes, 1968; Janson, 1981b). The strength of a longitudinal design is the possibility of studying individual development, and that cohort effects are separable from age effects. The weakness of a longitudinal design is the difficulties in generalizing from the cohort studied to other cohorts (generations) for some kinds of studies, and that the results from a longitudinal study are not available until several years after the study was initiated. With a cross-sectional design it is possible to initiate and implement a developmental study within a year or even a shorter time. However, a cross-sectional study has severe deficiences in that individual development can not be studied, and age and cohort effects are confounded.

Since our emphasis is on the development of the complete maladjustment pattern for each individual, we judge it necessary to use a truly longitudinal design in which the maladjustment pattern for each individual is followed over time.

When discussing methodological problems in studying change , the focus in the litterature has almost always been variable centered. The case with a single psychological characteristic as the dependent variable is often treated; this variable assumed to be measured on an ordinal or interval scale (see, for instance, Bergman, 1972b). The problem of age-specific measurements it then almost always troublesome when interpreting the psychological meaning of an observed change (see, further in Harris 1963). For instance, is a decrease of ten points on a test anxiety score for an anxiety test administrated at age 10 and 15, respectively, really a decrease in test anxiety, or does this decrease just reflect an in-creased level of denial of anxiety with age?

Our main concern is with the development of patterns of maladjustment. To the extent that the patterns can be reduced to a limited number of syndromes or types, this corresponds to a statistical model where the development is studied for a variable scaled using a nominal scale. The conceptual problems in the study of change are not avoided completely in this situation, but they are somewhat different and also somewhat alleviated. They are alleviated in the sense that no assumptions have to be made that measures from different points in time really measure the same construct on the same scale. For each individual the transition can be studied between the syndrome at one point in time according to the classification at that time and the syndrome at another point in time ac-cording to the classification at that time. However, with many possible syndromes at each point in time, and somewhat different classifications at different points in time, the description easily becomes very compli-cated.

One way of studying change in syndromes which avoids the complic-tion mentioned above is to score for change all indicators that are common at two points in time. Krauth & Lienert (1973) has suggested such a pro-cedure where a positive change in an indicator is scored '+', no change is scored '0', and a negative change is scored '-'. For instance, an indi-cator taking values from 1 to 20 at each point in time is used for sco-ring a change variable which is given the value '-' if the difference is

less than minus 1, the value '0' if the difference is 0 ± 1, and the value
'+' if the difference is larger than 1. For t indicators there are
3^t possible change profiles, and such data can be analyzed with KFA
as shown by them. At first glance one is inclined to believe that,
applied in this connection, this method shares many of the problems con-
nected with the univariate study of change for a characteristic mea-
sured on an interval scale; mainly the difficulty of the psychological
interpretation of a change score. However, we believe that this problem
is somewhat alleviated with the KFA-procedure, since only very broad
categories are used as indicators of change.

Another way of analyzing change between two or more points in time
is to view the types at each time as states of being. Assuming the same
possible states at the different points in time it is then possible to
apply a statistical model for the transition between states at different
points in time, e.g., a Markov chain model. In the present context we
believe that such models have limitations; mainly doubtful statistical
assumptions (for instance, in some models an assumption is made of 'no
memory' of the process), and problems in interpreting a state as being
identical between different points in time.

Consider the situation when change in the adjustment pattern between
two points in time is to be studied. If we are unwilling to make the
simplifications and assumptions suggested in the above models, wer are
back to the complicated result structure that was mentioned in the nomi-
nal variable case. It can be illustrated by the data matrix in Table 9
below.

In Table 9, for instance, n_{21} means the number of persons classi-
fied as belonging to Syndrome 2 at time 1 and belonging to Syndrome 1
at time 2. Such a data matrix easily becomes very complicated to over-
view and interpret, but we believe that these problems often can be solved
by a careful description where an initial cross-tabulation like the one
in Table 9 is broken down in successive smaller cross-tabulations con-
taining percentages, for instance, by combining values or by just

Table 9. Data matrix for the results when studying change between two
points in time.

| Syndrome | Syndrome at time 2 | | | |
at time 1	1	2	3 , , , , , k	
1	n_{11}	n_{12}	n_{13}	n_{1k}
2	n_{21}	n_{22}	n_{23}	n_{2k}
3	n_{31}	n_{32}	n_{33}	n_{3k}
,	,	,	,	,
,	,	,	,	,
j	n_{j1}	n_{j2}	n_{j3}	n_{jk}

studying a few values in each table. Great care has also to be taken in
order to make the classification at each point in time suitable for a
change analysis.

In the next step, change syndromes are constructed after careful in-
spection of the results, and these are related to the patterns of mal-
adjustment at time 3 etc. Alternatively can the above kind of analysis
be performed for each pair of points in time (or just each adjacent pair).

There are various tools available to aid in the above kind of analyses.
Krauth & Lienert (1982) indicate a procedure using fourfold table tests
in a similar way as in their multi-sample KFA. Log-linear models can also
be used. Goldstein (1979) gives an example in which a 2 x 5 cross-classi-
fication table is analyzed; the rows being two levels of reading scores
at age 16, and the columns being five levels of reading scores at age 11.
Looking at Table 9, it can be said that with a log-linear model the differ-
ent n:s are 'explained' by the linear effects and the interaction effects
in the general model. When testing if data fits a certain log-linear model,
the effects assumed to be non existant are set to zero. This kind of models

can be generalized to higher order tables (Bock, 1976), but the inter-
pretation of the results from such models is difficult, and it is not
easy to judge whether the necessary assumptions are met.

The importance of having a representative sample. A troublesome
problem in longitudinal studies is the lack of representativeness of
the samples in many investigations. The lack of representativeness
has two main causes:

(a) A biased group is chosen from the beginning, for instance, the
     sample is made up of the children in a day care school close
     to the university.

(b) In the implementation of the longitudinal study, subjects are lost
     due to biased attrition.

With regard to (a) above, the main point is naturally the degree of
representativity of the studied group for the population it is desired
to make inferences to. In our view, such problems are ignored to a
surprisingly large extent, and the conclusions of many longitudinal
studies are severely limited by deficiences in sampling (Bergman, 1972c;
Rutter, 1981; Wall & Williams, 1970).

In the present project the main group under study is defined as all
children in the third grade in Örebro in 1965 who received normal schoo-
ling.

This definition was applied for practical reasons and it does not
correspond perfectly to a definition of the population as all children
in the relevant age cohort in Örebro. For instance, 6% of the children
in grade 3 received special schooling, mostly due to severe reading dif-
ficulties, and they are not included. However, for most purposes the
applied definition should be acceptable if it is kept in mind that the
negative end of the distribution of some variables may be somewhat cur-
tailed.

Surprisingly good agreement has been found between the Örebro results
and results from other Swedish samples, at least with regard to intelli-
gence scores and achievement scores (Bergman, 1973) and with regard to

drop out from the school system after age 16 (Beckne, 1981). For many purposes, it appears reasonable to assume that the Örebro cohort is representative of a Swedish urban population of children of the same generation.

With regard to (b) above, we do not possess complete data for all children. In order to mimimize the drop out it may be advisable to use all individuals who have the necessary data for a certain analysis, and who belong to the population. In this way the possible drop out bias (see below) is reduced. This means that different analyses will include somewhat different indivduals which introduces complications. However, we estimate that at least 85% of the individuals will be identical between any two analyses. Nevertheless, it is important to investigate the effects on the results of the shifting composition of the groups in different analyses, and this can be done by utilizing the fact that we have at least some information for all individuals in the population.

The reason we put such emphasis on reducing the drop out rate is that the drop out presumably is selective in the sense that maladjusted children are overrepresented amongst children with incomplete data (Cox et al, 1977). Perhaps it will also be possible to introduce in the study a variable of the type 'drop out/not drop out' as an indicator of maladjustment.

In a longitudinal study, some information is almost always at hand also for drop out cases, and this information can be very useful when analyzing the effects of the drop out on the results (Bergman, 1972c; Robins, 1978). This is also the case in our project. As shown by Bergman, it is in some situations even possible to correct for the effect of the drop out on the results.

Complications introduced by errors of measurement

It is well known that errors of measurement complicate the study of change, and often more seriously than within most other fields of study. To illustrate the problem, take the case of a single dependent variable, measured on an interval scale, and studied at two points in time. Let us

make the classical test theoretical assumptions (see, for instance, Magnusson, 1967) in which an observed score is composed of a true part and an error part, and denote the involved variables as follows:

$$X = X_t + X_e \qquad (1)$$

$$Y = Y_t + Y_e \qquad (2)$$

where X is the observed score at time 1

X_t is the true part of the score at time 1

X_e is the error part of the score at time 1 and,

corresponding1y for Y, Y_t, and Y_e.

The change score Y - X can then be expressed as

$$Y - X = (Y_t - X_t) + (Y_e - X_e) \qquad (3)$$

Usually, Y_t and X_t are highly correlated, and in the case of no true change identical. It can then be shown that the variance of $(Y_t - X_t)$ usually is much smaller than the variance of Y_t or X_t. On the other hand, Y_e and X_e are independent of each other and $(Y_e - X_e)$ has a variance which is the sum of the variance of Y_e and of X_e. Thus, the error part of the variance is larger in relation to the true part for the change score than for the score of Y or X, and, correspondingly, the reliability is lower. This is developed more fully in Bergman (1971, 1972b).

The above line of reasoning point to the danger in using change scores for imperfectly measured indicators. In many situations it may then be advisable to use very broad categories for classifying change scores.

When studying patterns of maladjustment, errors of measurement also introduce complicated analytical problems. Intuitively this is realized when it is understood that a response pattern can be viewed as indicating a multiple difference structure.

Consider the situation when we want to find patterns of maladjustment among k indicators, X_1, X_2,....X_k, with indicator X_i taking the values C_{i1}, C_{i2},....C_{ir}. Denote the probability of indicator X_i being misclassified for an individual when it truly is C_{ij} with m_{ij}, and assume that all classifications are independent of each other. The probability of all k indicators being correctly classified, here denoted m_0, is then given by formula (4) below for the response pattern $X_1 = C_{1j}$, $X_2 = C_{2j}$,....$X_k = C_{kj}$.

$$m_0 = \prod_{i=1}^{k} (1 - m_{ij}) \qquad (4)$$

If we assume that all misclassification probabilities ar equal, and denote this probability with m, we can simplify (4) to

$$m_0 = (1 - m)^k \qquad (5)$$

In this case, the probability of all k indicators being correctly classified, except g, denoted m_g, is given by the binominal probability

$$m_g = \binom{k}{g} (1 - m)^{k - g} m^g \qquad (6)$$

To exemplify the practical implications of the above formula, the probabilities of no, at most one, at most two, and at most three, misclassifications of an individual's true response pattern are given in Table 10 for the case with ten indicators. Three different cases with different probabilities of misclassification of a single indicator are presented.

Table 10. Probability of different numbers of misclassifications for a profile of 10 indicators. Assumptions as in formulae (5) and (6).

Number of misclassifications	Probability of misclassification of a single indicator			
	0.30	0.20	0.10	0.05
0	0.03	0.11	0.35	0.60
Not more than one	0.15	0.38	0.74	0.91
Not more than two	0.38	0.68	0.93	0.99
Not more than three	0.65	0.88	0.99	1.00

It is seen from Table 10 that, for instance, the probability of
not more than one misclassification is depressingly low, if the relia-
bility is not very high. The following three conclusions can be drawn
from this:

(1) It is very important to use indicators having a high reliability.

(2) As few indicators as possible should be used in the pattern analysis.
     Sometimes several indicators of the same concept is at hand, and
     these can then be combined so as to increase the reliability.

(3) When classifying persons according to their response pattern, the
     methods used should be robust with regard to the effects of errors
     of measurement. We believe this is the case for KFA. Below a method
     for cluster analysis is suggested in which the problem of misclassi-
     fication to some extent is taken into account.

Assume that we have access to true values in k indicators for n
objects, and that indicator i, denoted X_i, as before, takes on r_i
different values. The number of different combinations or possible
response patterns denoted w, is then given by formula (7).

$$w = \prod_{i=1}^{k} r_i \qquad (7)$$

For instance, k = 8, and $r_1 = r_2 = \ldots = r_k = 2$ gives w = 256,

k = 10, and $r_1 = r_2 = \ldots = r_k = 4$ gives w = 1048576, and

k = 20, and $r_1 = r_2 = \ldots = r_k = 3$ gives w $\sim 3.5 \cdot 10^9$.

Normally, if n is not small compared to w and if types exist,
we should expect to find that certain patterns occur in several persons,
and that other patterns do not occur at all. What happens to the result
structure if there is a probability larger than zero that each indicator
is misclassified? For the sake of concretion, let us assume that we
have 10 indicators (k = 10), and that the probability of misclassifi-
cation for each single indicator is 0.10. Let us also assume that the
assumptions made in Table 10 holds and that missclassification probabili-
ties are identical for all persons. The probability of no misclassifi-
cation for a given person is then 0.35, i.e., if, say, 20 persons

have a certain true response pattern , we should expect on the average 0.35 x 20 = 7 of them to show such an observed response pattern after errors of measurement have been introduced. It is intuitively realized that misclassifications of the type we discuss here will normally not lead to new types but rather to a scatter of the observed response patterns.

The implication of the above line of reasoning is that errors of measurement may well lead to important types being underrepresented in the observed response patterns. It seems reasonable to assume that types frequently observed should be more frequent if no errors of measurement were present. When clustering objects it then appears natural to find the frequent response patterns or types, and then add to each type the objects that are similar to that type. (It should be noted that by a 'type' we here simply mean a response pattern that often occurs regardless of whether it occurs more frequently than expected from the marginal frequences. Of course, 'konfigurationstypen' as previously defined may be of special psychological significance, but this is not reflected in the analyssis, and is left to the stage when the results of the analysis are to be interpreted.) As a measure of similarity, for instance, the agreement score of McQuitty (1954) could be used. We call this method the 'type leader method'.

The suggested procedure will in many cases produce similar results to ordinary cluster analysis, but there are also important differences:

(1) If no initial types are found, the type leader method will not be applicable. This will usually be the case when the number of possible response patterns is large (see Formula (7)) compared to the sample size. However, in our study of maladjustment we will make every effort to keep down the number of variables or indicators, and the sample sizes are over 400 for both boys and girls.

(2) The measures of similarity we use are in relation to the specified types, and are not computed for every pair of objects.

(3) A maximum degree of disagreement to a type which is tolerable
     must be specified, and this will in practice often lead to quite
     a few objects being left unclassified. These can either be cluster
     analyzed separately in a conventional cluster analysis or classified
     by visual inspection. Perhaps a certain residue of unclassified
     objects should be allowed rather than forcing such objects into a
     classification that does not fit. Considering the state of know-
     ledge in this field of psychology, deficiencies in concepts and in-
     dicators and so on, this may lead to a truer presentation of the
     facts.

     We are interested in studying syndrome or type change. Consider the
situation when change between two points in time is studied. In addi-
tion to the problems of finding syndromes in the presence of errors of
measurement, which were discussed above, another problem appears. Let us
assume that the probability of syndrome misclassification at each point
in time is 0.20. Under assumptions of independence etc, this means
that as many as 36% of the persons will not be represented in the cross-
tabulation with their true syndrome at occasion 1 x true syndrome at oc-
casion 2. Again, the conclusion is that the classification at each point
in time must be very reliable; the most important determinant of this
being very reliable single indicators.

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