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Kurt A. Heller and John F. Feldhusen

(Editors)

Identifying and Nurturing the Gifted

An International Perspective

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CHAPTER IV

Identification, Development and Analysis of Talented and Gifted Children in West Germany

Kurt A. Heller & Ernst A. Hany

Introduction

The topic of giftedness is growing in interest in the Federal Republic of Germany. This is somewhat amazing, since in the last 20 years, the problems of the handicapped and of underprivileged groups have had the public's attention and been the focus of scientific research. Only in recent times has the challenge which the gifted present society been recognized.

Systematic study of problems of the gifted and social problems connected with giftedness has really just begun. This is due to the following conditions: 1) the fear of elitism and diverse prejudices, such as the idea that gifted children and adolescents develop optimally without outside help and will be successful in life whatever they do; 2) the (mistaken) assumption that fostering of the gifted must come at the expense of the handicapped and is thus not consistent with our modern conception of democracy; 3) the rapidly growing number of activities - organized and unorganized - claiming to foster gifted children and adolescents - often without a scientific basis, that is, without enough research evidence about what the activity is supposed to bring about and what educational-psychological effect it is supposed to have.

It would be disastrous in this situation for the major disciplines concerned (pedagogy, psychology, sociology and medicine) not to be involved in research and development related to giftedness. In our opinion, an individually appropriate and society-demanded action is not possible or at least not defensible without scientifically proven results about the phenomena and the structure of giftedness. Therefore, empirical studies on giftedness are no less important than in any other pedagogic-psychological area. This is the background and intention of the research project described here, which is financed by the Federal Ministry for Education and Science (Bundesministerium für Bildung und Wissenschaft - BMBW - Funding number B 3570.00 B).

1. Preparatory Work and Goal of the Munich Study of Giftedness

Many studies attempting to locate the so called 'talent reserves' were done during the sixties (HITPASS, 1963; AURIN, 1966; HELLER, 1970a/b, 1972). These early studies, whose goal was to uncover hidden talents, were not only an important impetus toward educational reforms, but also several important methodological innovations came about, especially with regard to the problem of identification. The use of cluster analysis techniques was particularly useful in the multi-factor classification of various school groups with respect to several types of giftedness (HELLER, 1970; ALLINGER & HELLER, 1975). This idea was later developed further by ROSEMANN (1978) and ROSEMANN & ALLHOFF (1982) in the so-called typology-predictive model.

As is further discussed below, our study of giftedness is also based on a multi-dimensional giftedness concept, which makes a multi-factor classification model necessary. In contrast to this, most identification attempts still make use of the same outdated cut-off scores, where the definition of giftedness is based on being above a particular IQ-score or a certain percentage is the criterion. This procedure contradicts newer theories of giftedness, and it is our opinion that there is not *one* giftedness but various forms of giftedness.

The *Munich longitudinal study* (4–6 years), planned in 1984 and begun in early 1985 has three main goals:

1) the construction and trial of diagnostic instruments for the reliable and valid identification of gifted children and adolescents (age 4 to 14);
2) the analysis of achievement behaviors of gifted students under various conditions (variations of situations and demands);
3) the longitudinal analysis of individual developmental processes of gifted children and adolescents including positive and negative socialization influences, critical life events, etc.

A great number of other questions associated with this are to be approached in connection with theoretical and methodological considerations. The methodological problems of identification are, of course, not independent of the definition question. What should be understood under the term 'giftedness'? Since this question was discussed in great detail in the preceding chapters, we will limit ourselves to a few comments about our theoretical concept of giftedness which have special meaning here. Those models will be described in more detail which make up the theoretical framework of the empirical study.

2. Conceptual and Theoretical Perspectives

If one considers 'giftedness' to be the product of interaction between genetic and environmental factors, then - assuming (not without just cause) differen-

tial influences on both sides – different types of giftedness are to be expected. GARDNER (1983), for example, with his multiple intelligence theory, postulates no less than seven types of giftedness. RENZULLI's three-ring conception of giftedness (1978, 1981), has been expanded by MÖNKS & VAN BOXTEL (1985) to six factors with the social settings family, school, and peers (cf. Chapter 3). Personality factors are also seen here as part of the hierarchy. It is questionable, however, whether RENZULLI's 'task commitment' should be classified as a *giftedness* factor or rather as a non-cognitive personality trait. As seen in figure 1, a general causal model can be sketched which also includes environmental factors. Conceived as a diagnostic-prognostic model, the predictor is on the left side with the performance behavior as criterion on the right.

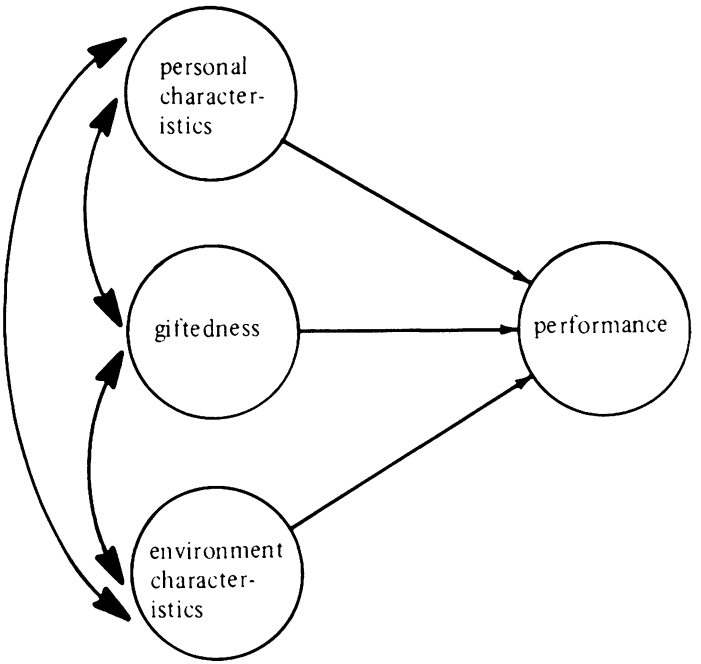


Figure 1: Causal model of performance behavior in the gifted

The following are the more important (non-cognitive) personal traits which influence the relationship between ability and performance in a relatively constant manner: achievement motivation, individual goal setting, and locus of control, all within an expectancy-value-theory of motivation. In addition, interests, self-concept of giftedness, style of learning and of coping with cognitive and emotional demands play a role as well. Environmental factors which

influence performance behavior are, for example, the stimulation and achievement pressure of the social learning world; success and failure experiences; or the reaction of parents, teachers, and peers to these experiences, and the emotional atmosphere in the family and classroom. According to our hypothetical model of giftedness, different ability areas can roughly (and tentatively) be assigned to the achievement domains (figure 2).

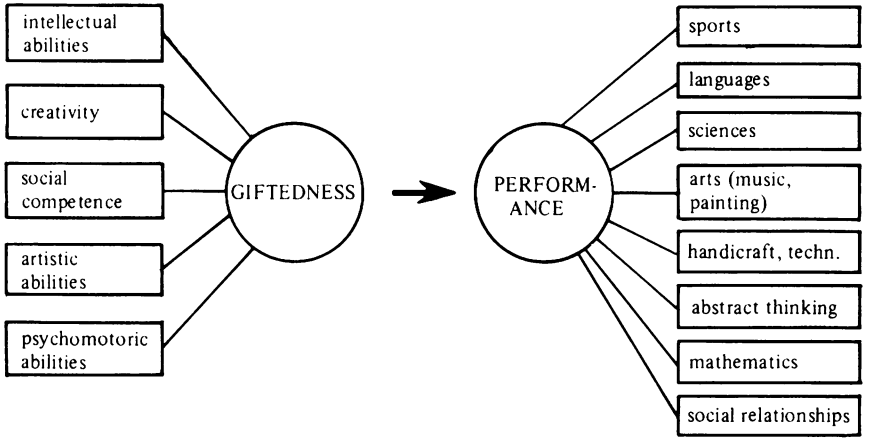


Figure 2: The division of giftedness and achievement with information about talent factors and performance areas

To be sure, a heuristic function is initially attached to this model for its use in the planned screening and in the search for relevant indicators for instrumentalization of the diagnostic testing. Certainly, we expect more differentiated forms of giftedness, that is, a comprehensive system of types of giftedness. Above-average intelligence ('Kernintelligenz' sensu MIERKE, 1963) is considered a necessary but not sufficient condition, i.e that the convergent reasoning complex is achieved. The degree to which each of the factors is distinct (high intelligence, creativity and/or artistic talent, social competence, psychomotor ability, etc.) determines the respective form, the actual pattern of giftedness.

In order to identify gifted underachievers or other socially disadvantaged groups (e.g. gifted children of foreigners), a product-oriented approach or achievement as criterion must at first be dismissed. In contrast to an ex-post-facto definition, the diagnosis-prognosis approach is favored here. The connection to the performance criterion dare not be forgotten. This would be foolish, given that recent cognitive psychology studies based on the expert-novice paradigm have provided much information about problem-solving be-

havior of the gifted compared with chronological peers of average ability (WEINERT & WALDMANN, 1985). As PUTZ-OSTERLOH (1981), DÖRNER & KREUZIG (1983), KLIX (1983), DAVIDSON & STERNBERG (1984) or STERNBERG (1985) were able to show so conclusively, the gifted are better than their less able agemates at solving demanding complex problems and their knowledge base was much larger. The methodological consequence for identification of the gifted thus has to consider at least the following points:

(1) Traditional IQ methods are not sufficient for diagnosis of giftedness. At best, the necessary knowledge and convergent thought processes, still recognized as important abilities, can be understood but giftedness is not adequately identified. Intelligence tests need to be supplemented by measurements of divergent thought processes (creative aspect) or even better, by tests which simultaneously measure divergent-convergent problem-solving abilities, such as those from FACAOARU (1985).

(2) The status diagnostic approach to measuring complex cognitive abilities should be supplemented (not replaced!) by process diagnostic methods. Possibilities for the realization of this will be shown at a later point.

(3) Finally, appropriate measurement of the concept 'giftedness' necessitates an instrumentation at different levels, that is consideration of various methods based on the level of abstraction and degree of complexity of the variables being studied. Such multifaceted instruments make a quantitative *and* a qualitative differentiation of giftedness possible. In addition to important primary abilities, relatively complex attributes can also be included in this manner, for example, cognitive style attributes (reflexivity, persistence, self-efficacy beliefs, etc.) or motivational aspects of task coping.

In summary, it should be clear that a multi-dimensional view of giftedness makes differential diagnosis and a classificatory approach to data processing necessary. Beyond this, the expected results of our combined longitudinal/cross-sectional study are in many ways relevant to counseling and teaching practices (cf. HELLER, 1985):

(1) A purposeful fostering of giftedness is difficult to imagine without adequate proven diagnostic information. This is even more true for the identification of the gifted individual. Most of the conventional tests are not appropriate because of ceiling effects or other problems (e.g. low validity for giftedness traits). One of the most pressing tasks of our research project is therefore, to put together or develop an appropriate diagnostic instrument for identifying gifted children and adolescents in German-speaking regions. The instrument will be evaluated for validity and reliability in several age and student groups.

(2) The research is not only important for the evaluation and optimization of the identification process, but also because it offers important information about individual development of the gifted and about specific psycho-social problems. This knowledge is vital for appropriate teaching and educational measures, as well as for counseling or psychological interventions where

necessary for the individual case. Beyond this, important results are expected about socialization and prevention.

(3) Logically, typical cases for counseling in our longitudinal study have to be included and the development of counseling concepts in accordance with this has to be examined. Finally, appropriate measures for parent counseling and further qualifications for teachers' and counselors' training should be tried out. This problem complex, however, is momentarily beyond the scope of this project and must be covered by accompanying work. A comprehensive fostering and counseling approach would also have to include medical-psychiatric problem aspects (cf. Chapter 12).

3. Method

The research methods to be used must be based on the questions raised and the goals of the project. Methods include the type of instruments used and the data analysis procedures as well as the decision-making strategies for selecting gifted children.

3.1 Methods of Identifying the Gifted

The methods of classification are primarily dependent on the goal of the classification. That goal determines the content, procedure, and energy to be invested. If one is looking for mathematically capable students for an enrichment course at school, one may be satisfied with the math teacher's recommendation or a short math abilities test. But if one is looking for students qualified for an expensive scholarship to be awarded for several years, then more exact and complete diagnostic measures are called for in order to avoid false decisions.

Unfortunately, the relationship between the goal and the method of identification is often overlooked. Thus, the reason for identification is often left unspecified in recommendations for procedure (e.g. OTEY, 1978; TORRANCE, 1970) and is not considered in evaluation of the identification process (e.g. DIRKS & QUARFOTH, 1981; RENZULLI & SMITH, 1977). One exception to this is found in SHWEDEL & STONEBURNER (1981). ALVINO, MCDONNEL & RICHERT (1981) also complain, on the basis of a nationwide study, that "many tests/instruments are being used for purposes and populations completely antithetical to those for which they are intended and were designed" (p. 128).

The goal of identification in our project is *not* a special educational program but rather solely scientific interest in the target group of gifted and in their individual characteristics and development. This will not lead to any identification recommendations. Furthermore, methodological ideas from

practically oriented studies (e.g. PAYNE & HALPIN, 1974; COHN, CARLSON & JENSEN, 1985) cannot be implemented.

Therefore, we are dependent on methods from experimental psychology which, however, are only of limited use in the field of education. The main hypotheses of our study – and the experimental planning has to be based on these – are 1) that there are various types of giftedness, and 2) within the empirically determined giftedness patterns, those persons with the highest values are to be considered highly gifted. This means that our instruments should measure several factors of giftedness as independently from one another as possible. And they must necessarily differentiate well in the upper ranges. We meet these requirements by a) employing a two-step identification process and b) using multidimensional measurements in both steps.

This procedure has several advantages: In the first step, a rough selection process (which does not have to be extremely valid) is satisfactory, in order to eliminate a large number of those who are not qualified from the limited number of qualified (gifted) students (DRENTH, 1969). The identification methods in the second step can then measure more exactly and avoid the 'bandwidth-fidelity-dilemma' (CRONBACH & GLESER [1965]). In the first step, teachers are asked to nominate the best students from their class as compared with all of their chronological peers, i.e. to judge them on the basis of various dimensions of giftedness. These are the same dimensions (intelligence, creativity, social competency, psychomotor abilities and musical abilities) which are considered in the testing that follows for the remaining 20 percent of the original sample (cf. figure 3). Standardized aptitude tests and differentiated questionnaires (for students and teachers) are employed with the goal of further reducing the 20 percent studied to the top 2 or 3 percent. At the same time, the methods are supposed to include enough variance to determine types of giftedness using cluster analysis. Instruments with an average difficulty of .20 to .10 (probability of solving) would be ideal, as well as normally distributed values, since we would like to use the computer program NORMIX (improved by German researchers - WOLFE, 1971; ROSEMANN & ALLHOFF, 1982) for the grouping of subjects. This makes the estimation of population parameters possible – assuming that the variables are normally distributed.

Our work on the construction of tests which meet the mentioned requirements is in progress. The goal is the development of a diagnostic instrument which will quickly and simply make possible a) qualitative assignment to a stable type of giftedness and b) the quantitative classification within the relevant giftedness dimensions.

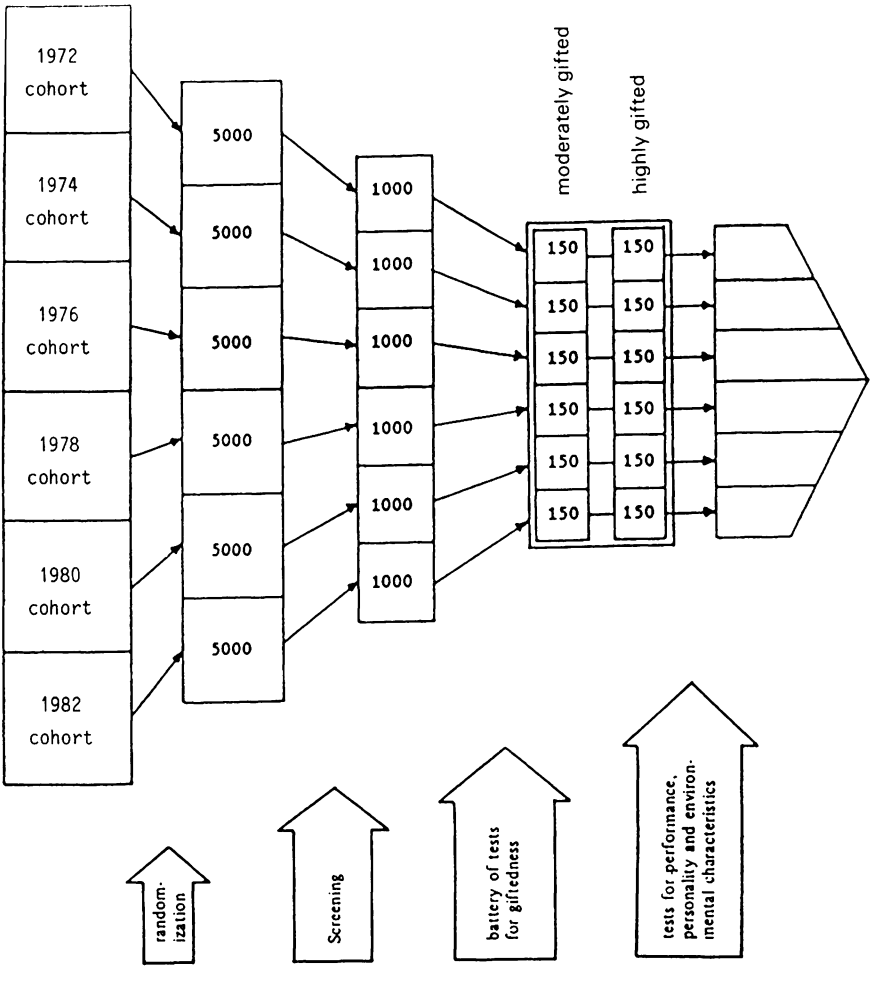


Figure 3: Sequential strategy for the differential identification of highly gifted youth

3.2 Methods of Predicting Extraordinary Achievement

We also use a prognostic approach because every observation of giftedness is aimed at predicting future achievement in standardized situations (such as in classes, programs or careers). We do this in order to a) gain insight into the often unclear relationship between giftedness and achievement (cf. GAGNÉ, 1985), and b) validate our definition of giftedness. The criteria here are scholastic and extracurricular successes and recognition; the prediction of

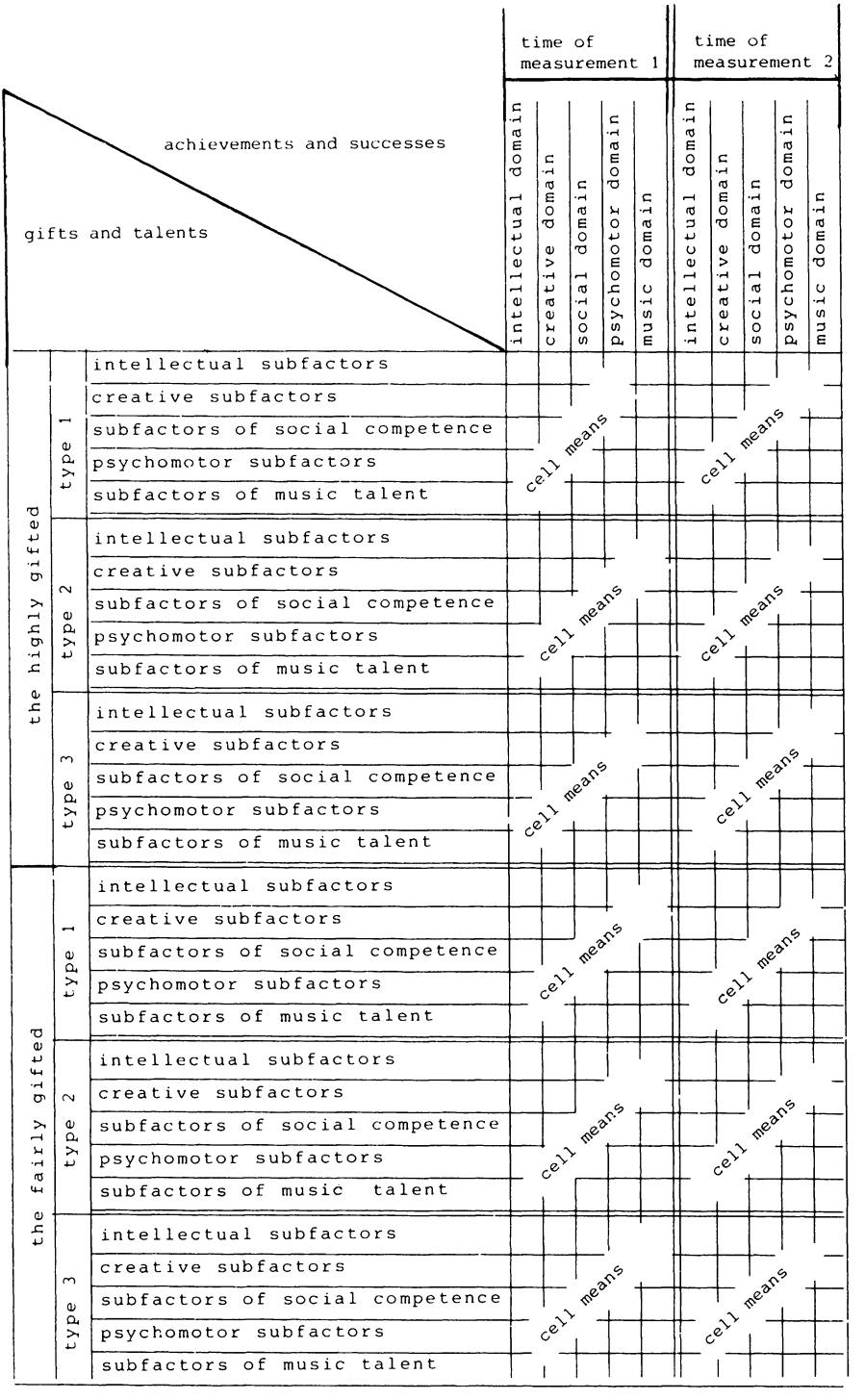


Figure 4: Design of analysis of variance with measurement points and the factors: talent dimension, giftedness type and experimental or control group for the prediction of area specific performance and success

achievement is separated and pooled (cf. figure 4) for 1) individual giftedness dimensions, 2) for the types of giftedness found, and 3) for the group of highly gifted in comparison with a control group of moderately gifted who have somewhat lower values in the giftedness factors than the highly gifted do. Depending on the questions raised, analysis of variance, discriminant analysis or regression analysis will be used. Figure 4 shows an example with a complex analysis of variance which includes the factors cohort, type of giftedness, experimental and control group, and giftedness dimension. The criteria are the area-specific achievements (collected over a period of years in a longitudinal study).

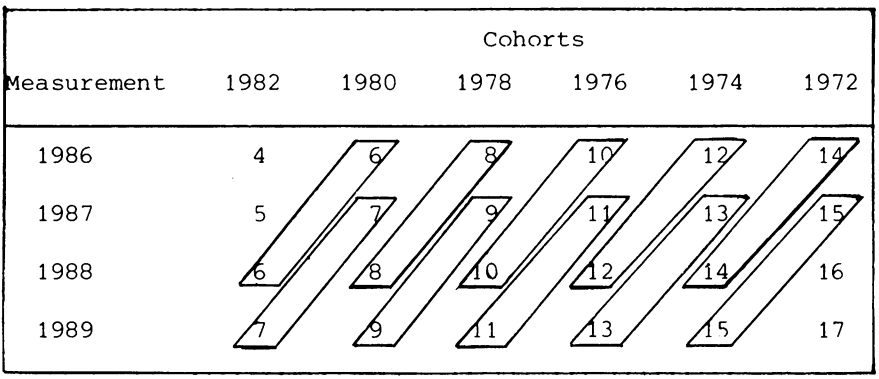
In addition to the abilities, other personality characteristics will be established as predictors or moderators (e.g. self- concept, achievement motivation, etc.).

3.3 Methods of the Longitudinal Study

The measurement of ability and achievement will be repeated yearly for as long as the project is financed. The financial support from the Federal Government is tentatively planned for several years. Since six age cohorts will be studied, a longitudinal-sequential design (BALTES, REESE & NESSELROADE, 1977) will be possible. However, since the number of cohorts is greater than the number of instances of measurement, only age x cohort analysis for partial matrices of the total design are possible (cf. figure 5d). More extensive evaluation for age by instance-of-measurement (figure 5c) and for determination of age or cohort effects (according to SCHAIE, 1968; cf. figure 5a and 5b) will be possible. Through the use of appropriate statistical methods, the level of changes of various giftedness factors should be determined - whether the highly gifted remain stable in their achievements as compared with the fairly gifted; whether the giftedness patterns appearing at various age levels become more differentiated with increasing age, etc. An important condition for this determinations is the use of the same type of measurement (regarding content and method) of the individual attributes at each age level. Thus, method artifacts can be avoided in the age comparison. If we are successful in finding a battery of analogous tests so that reliable measurements can be made after longer intervals, this will create new possibilities in the identification of highly gifted. Admission to a program for gifted children can consider not only the individual's present state of giftedness and achievement but also his or her long-range development.

	Cohorts					
Measurement	1982	1980	1978	1976	1974	1972
1986	4	6	8	10	12	14
1987	5	7	9	11	13	15
1988	6	8	10	12	14	16
1989	7	9	11	13	15	17

Figure 5 a



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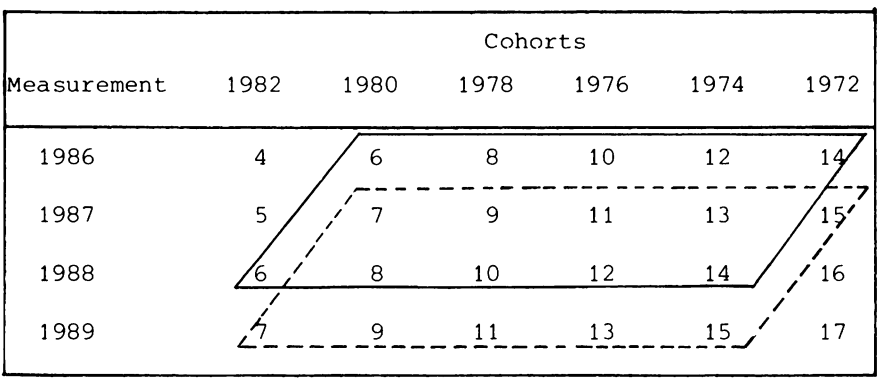

Figure 5 c

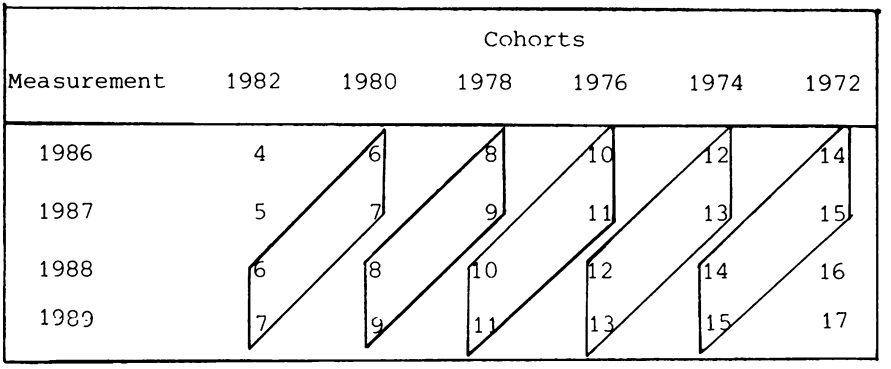

Figure 5 d

Figure 5: Design of data analysis for the longitudinal study: a) analysis of age effects, b) analysis of cohort effects, c) cohort x point of measurement, and d) age x cohort effect

3.4 Instruments

The test and questionnaire battery for determining factors of giftedness, achievement and personality is made up of many instruments. Two or more tests have to be used for some of the characteristics, e.g. one for the younger children (6–8 years), one for the medium range, and one for the oldest ones.

The cognitive abilities will be measured with the KFT-K and the KFT 1–3 (HELLER & GEISLER, 1983) or with the KFT 4–13+ (HELLER, GAEDIKE & WEINLÄDER, 1976, 1985), German forms of the Cognitive Abilities Test, Primary I and II (THORNDIKE & HAGEN, 1971). These tests measure (THURSTONE's) primary mental abilities: number, reasoning, space, and verbal comprehension. This measurement is supplemented by the 'Zahlenverbindungstest' (ZVT) from OSWALD & ROTH (1978). This connect-the-numbers test (ZVT) measures the speed of simple cognitive operations. As simple as this characteristic is, it serves as a good indicator of general intelligence (cf. JENSEN, 1982; VERNON, 1983).

For the measurement of creativity, both production tests (TORRANCE, 1972) and new scales for divergent-convergent thought process will be employed. The latter were developed by FACAOARU (1985) for use with engineers and were recently adapted for school children (FACAOARU & BITTNER, in press). The complex tasks measure goal-orientation of creative thought, flexibility in problem-solving strategies, self-control in motivation, tenacity, and other factors which traditional tests do not measure.

For the psychomotor abilites, new test procedures were developed which are economical to acquire and to employ. The younger subjects are presented with

tasks from LEGO. Fine motor activities and constructions are called for. A complete test program was worked out for the older subjects which is presented on a computer. Simple tasks are combined with more strenuous ones (including perceptual speed, spatial orientation, and strategic planning) (HANY, in preparation).

Social competence and musical talent will be measured with new questionnaires which have been developed in our project and in part evaluated in pretesting.

Three motivational factors are to be measured: achievement orientation (hope for success, fear of failure), task commitment, and intrinsic vs. extrinsic incentive. We are employing subscales from HARTER (1981), HERMANS (1974), LEHWALD (1982, 1985), and SMITS & VORST (1982). The students are also asked about their special interests. The interest questionnaires we have developed are directed toward academic/cognitive achievements, creativity, psychomotor ability and sports, music, and social activities. We have oriented ourselves here on proven methods (for example, KHATENA & MORSE, 1985; KHATENA & TORRANCE, 1976; MCGREEVY, 1982; TAYLOR & ELLISON, 1978).

In addition to these tests, we are also using questionnaires to measure creative achievements in many areas of interest. The model for this are instruments from Sylvia RIMM for all age groups (RIMM & DAVIS, 1980).

4. Sample Planning and Organization

Our sample must have the following characteristics:

(1) It should be relatively representative of the Federal Republic of Germany.
(2) At the end of the selection of highly gifted youth, the sample at each age level should be so large that enough subjects for each expected pattern of giftedness is present and no type disappears in following years through 'experimental mortality'.
(3) It must be about 33.3 times as large as mentioned in (2) above since the rate of selection for highly gifted is to be about 3%.

A simple computation gives us 30,000 subjects in the initial sample, inasmuch as 150 subjects are desired as highly gifted at each level. We have been striving for this number and despite political and organizational problems, we were able to acquire some 25,000 subjects during the last few months.

The first identification phase (teacher nomination) was completed in February 1986. During the months March to July 1986, the data collection for the second phase (tests and questionnaires) took place after which the final subject selection for yearly measurement will be established. Following the summer vacation, starting September 1986, another follow-up study is planned in which additional personal and environmental factors relevant to a causal

model of creative achievement are to be collected. The first results on the quality of the instruments used as well as on the structure of giftedness and the relationship between giftedness and achievement should be ready in the fall of 1986. There is much left for us to do before then.

Summary

In the past highly gifted children were mainly identified using intelligence quotients. This practice led to a one-dimensional definition of giftedness in theory. Currently, multi-factor concepts of giftedness are preferred and also put into practice. Strangely enough, the concepts of giftedness that are employed are seldom analyzed regarding their validity or their connection to the achievement behaviors of the gifted or even with regard to developmental-psychological aspects. The research project being carried out at the University of Munich on giftedness follows a different path, that of the so-called typological approach. Assuming several dimensions of giftedness (intelligence, creativity, social competence, psychomotor, and musical abilities) or trait configurations, different types of gifted children are found. The types are defined here as various giftedness profiles which are empirically separate groups. In each group, those children with the highest values on the relevant dimension are the highly gifted.

In addition to the improved method of identification of gifted children and adolescents, the longitudinal study is based on the following goals: 1) Examination of the stability of types of giftedness over time; 2) Observation of changes in various individual types of giftedness over time and conditions causing change; 3) Examination of causal models in relation to potential adult achievement for each type of giftedness. The analysis of individual development processes and socialization conditions of highly gifted children and adolescents from the ages of 4 to 14 years will be carried out as well. The method design and the measurement instruments are described in detail and relevant problems of the research in progress are discussed. The results are not only useful for psychological counseling and educational nurturance of gifted students, but also they should create a reliable and valid basis for identification procedures.

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