# Educational Opportunity within and between Holland and Sweden: The Semi-Experimental Approach*

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## 1 Introduction

In some fields of sociology, such as social stratification, one may observe a renewed interest in international comparative research (cf. Hauser & Featherman 1977, Treiman 1977). Comparative social stratification research, however, seems to be more incidental than for example research in the education field. One may assume that the interest in comparative education — apart from a more academic point of view — is also kept alive by the activities of the UNESCO and OECD/CERI. These multinational organisations are in a relatively strong position to collect information from the national policy makers, a rather favourable situation compared with individual researchers. One of the main problems — as will be shown — is the comparability of the collected information. Many times obscure comparions are made, without realising that the national basis of the collected data is quite different.

A solution to this problem of incomparability is an explicit design of cross-cultural research projects. It is well known that only a few of such projects have been carried out. Enormous problems of financing and organisation arise, as well as problems of validation and standardisation. In the field of education especially, the Unesco educational achievement study (Foshay et al 1962), the mathematics study (Husén et al 1967) and the various IEA projects (a.o. Comber & Keeves 1973; see also Schwille & Marshall 1975) may be mentioned. In spite of careful standardised designs, some problems in comparing the simultaneous surveys of the participating countries have still been encountered (see for instance Inkeles 1976).

In this paper an alternative approach is applied. In stead of collecting new data, semi-experiments with matched groups are carried out on the basis of available data. Since in this kind of experiment relevant intervening variables can be controlled, comparisons can be made between net-effects of variables.

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This research strategy is applied on the problem of educational opportunity in Holland and Sweden.[1] In Holland two semi-experiments with matched groups – ex-post-facto experiments – were explicitly designed (Peschar 1975). In Sweden several high quality datasets on the socio-economic career have been collected that are suitable for similar ex-post-facto experiments.

A comparison of educational opportunity between Holland and Sweden may be interesting for a number of reasons.
First, Sweden is often referred to as an example of a society where social equality has almost been established. In the official policy of the Social Democratic Party, that governed Sweden from 1932, strong emphasis was put on this social equality in many respects (sex, class, race, ethnic). Though much remains to be desired in any society (Myrdal 1971), the general opinion is that Sweden is ahead of other countries in this respect. Income equality and high taxation are the keywords for Sweden.
Inspection of OECD figures in this respect,[2] however, reveals that there is a West-European industrial country in the very same situation, namely Holland. Other figures, such as the costs of social security, are even higher for Holland than they are for Sweden.[3]
Secondly Sweden is well-known for its educational system (see for instance OECD 1969b).
Beginning in the fifties many scientific experiments and researchprojects have been carried out in order to determine the best strategies for educational reforms (Husén & Boalt 1968).
In Holland (in this paper used as a synonym for the Netherlands) educational research is rather young, as regards innovation and evaluation of the educational system.[4] The various governments after World War II (varying from left-center to center-conservative coalitions) did not establish an explicit policy of social or educational equiality, though the issue has always been in the background. During the period 1973-1977 the left-center coalition government strongly changed this 'laisser-faire' policy and concentrated on the equal distribution of knowldege, income and power.[5] Of course it is much too early to say whether this policy has been effective.[6]

For these two reasons a comparison of educational opportunity in Holland and Sweden may be interesting. Implicitly the hypothesis can be tested whether the explicit policy of social equality and school reforms has been effective as reflected in educational outcomes.
In the next section some comparative findings on educational outcomes from available statistics for Holland and Sweden will be presented. Then the general design and the various data sources for our research will be discussed, before we turn to analysis and findings.

## 2 Some comparative findings on education

One of the very comprehensive reports about social influences on educational attainment (Husén 1975) lists a variety of research on the topic of educational inequality. From the findings however, it is not possible to compare two countries directly with each other. The measures of educational outcomes vary too much and are not standardisable.
In the six large project of the International Association for the Evaluation of Educational Achievement (IEA), carried out in the years 1970-1973, data for many countries have been collected. The aim of these projects was mainly the comparison of standardised achievement tests for various domains (science, literature, etc.). It is not possible to derive measures of educational outcomes and inequality from such findings.[7]
Most of the findings to be used for a cross-cultural comparison are compiled by the international organisations.
In Boudon (1974) some tables are published that enable a first comparison between Holland and Sweden on Inequality of Educational Opportunity (IEO). These tables are based on OECD data, that are provided by national governments. Two kinds of statistics are presented by Boudon: the rates of school attendance and the social class disparity index (Boudon 1974; 41-48). In Table 1 the rates of school attendance for both Holland and Sweden are presented.

*Table 1:* Rates of School Attendance in Percentage of Age Groups in 1950 and 1965 in Holland and Sweden

| | | | Holland | Sweden |
|---|---|---|---|---|
| *elementary and highschool combined* | | | | |
| | 1950 | a | 82 | 56 |
| | 1965 | b | 86 | 69 |
| | | b/a | 1.05 | 1.23 |
| *secondary* | | | | |
| | 1950 | c | 34 | 19 |
| | 1965 | d | 48 | 24 |
| | | d/c | 1.41 | 1.26 |
| *college* | | | | |
| | 1950 | e | 6 | 5 |
| | 1965 | f | 14 | 13 |
| | | f/e | 2.33 | 2.60 |
| *all levels combined* | | | | |
| | 1950 | g | 64 | 43 |
| | 1965 | h | 71 | 54 |
| | | h/g | 1.11 | 1.26 |

Source: OECD (abridge from Boudon 1974, 42 table 3.1)

From this table a few conclusions may be drawn: First the general participation level in Holland is higher than in Sweden at *all* levels of education a quite surprising finding. Secondly the growthrate of educational participation in Sweden for the investigated period of 1950-1965 is higher than in Holland. A quite different picture is drawn from another Boudon table. In this table – presented here as Table 2 – the rates of school attendance for the highest and lowest social class groups are divided, as a measure of IEO.

*Table 2:* Rates of School Attendance at College Level (Number of Students per 1000 Active Males) and Social Class Disparity Index for Holland and Sweden

| | Holland 1961—1962 | Sweden 1962—1963 |
|---|---|---|
| (1) Upper Class | 91.2 | 77.0 |
| (2) Middle Class | 24.6 | 52.0 |
| (3) Independent agricultural workers | 10.3 | 10.1 |
| (4) Other independent workers | 19.9 | 34.4 |
| (5) Lower Class | 1.6 | 5.5 |
| (6) Total Together | 12.4 | 21.4 |
| Disparity Index (1) : (5) | 57.0 | 14.0 |

Source: OECD (abridged from Boudon 1974: 45 table 3.2)

This so-called *social class disparity index* yields quite different values for Holland (57.0) and Sweden (14.0). From this viewpoint one should conclude that in Sweden much less inequality in educational opportunity exists than in Holland, at least for the period around 1962. Since this finding is in line with more common sense ideas I suppose it is not much critisized. There are however a few remarks, that can be made.

First it should be kept in mind that the overall rate of attendance in Holland was higher than in Sweden. Secondly it is easily seen that the disparity index is not very stable and heavily dependent on the distribution of social class categories, as Boudon (1974; 44) also realises.[8] A third remark is concerned with the decision to compute this disparity index only for the *college* level and not to present it for all secondary education. This is not only a definitory problem; the disparity index strongly depends on *what* is defined in the countries themselves as college level.

An example may be illustrative. In Holland the definition of higher education is resticted to university level. All the other advanced (vocational) training institutions after secondary education (teachers training, military and navy institutes, social workers academy etc.) are not included in figures for higher education, as is common in most OECD countries.[9] Therefore this

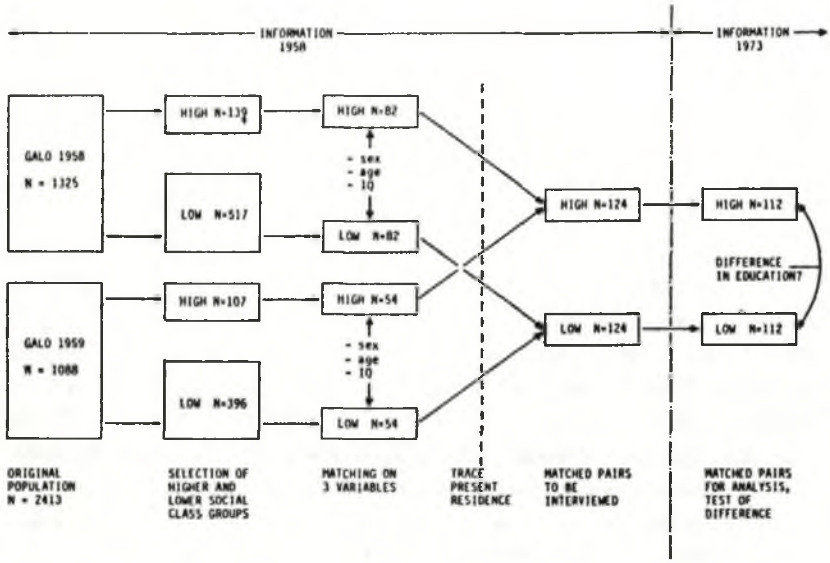
kind of statistics is inflated, as has also been noticed by the OECD authorities themselves (OECD, 1969a :20; OECD, 1975 : 162).
In such a case it is somewhat hazardous to draw firm conclusions as Boudon suggests (p. 46). Nevertheless he states that it 'seems reasonable to conclude that the US, Norway and Sweden display lower IEO rates than do the most of the continental countries of Western Europe' (Boudon 1974; 46).[10]

## 3 Research Model

In the foregoing we discussed some available findings with respect to IEO and noticed the incomparability of national categories. Yet another method for cross-cultural comparisons is available. In the last decade structural equations have become an acceptable technique in social research, especially path analysis. One of the ways in coping with all kinds of different scales is standardisation: determine the relative position on a scale within the population. In this way many advantages arise (for instance the introduction of multiplication terms in the models). Standardised variables however, should only be used *within* the same population and not for between sample comparisons, since the composition (variance) of the sample may be quite different. Therefore, one should be careful with the application of path models in cross-cultural research (for instance Kerckhoff 1974). The application of raw regression scores is out of the question since different scales must be applied.
The problem of IEO can also be formulated in a very simple way. Suppose two children from different social classes have the same relevant characteristics; how is their educational career to develop? If there is no IEO they will end up equally (at least on the average if many such pairs are selected). In fact, the statistical chance that they do not end up in an equal position may be defined as IEO.
This situation is exactly applicable for matched groups-experiments. In the datasets to be described in the next paragraph, the following procedure is applied on available samples of children tested at the age of about 10-12 years old.
Children from higher and lower social classes are selected. For every child from the higher social class a match is sought in the lower social class group with exactly the same characteristics on age, sex and IQ, thus creating a position of equal opportunity at the end of the primary school level. During a follow-up the *educational level at the age of 18* for all these matches is determined. It must be noted that this criterion is a better one than commonly used criteria such as number of years of education or the school attendance rates (see for instance Fägerlind 1975; 47/48). Of course it would be much better if even measurements of later educational performance or attainment would be available. In the cross-cultural comparison to be discussed in this paper

one of the datasets unfortunately restricts this possibility. The research model as it is applied for all the datasets is summarized in Figure 1.

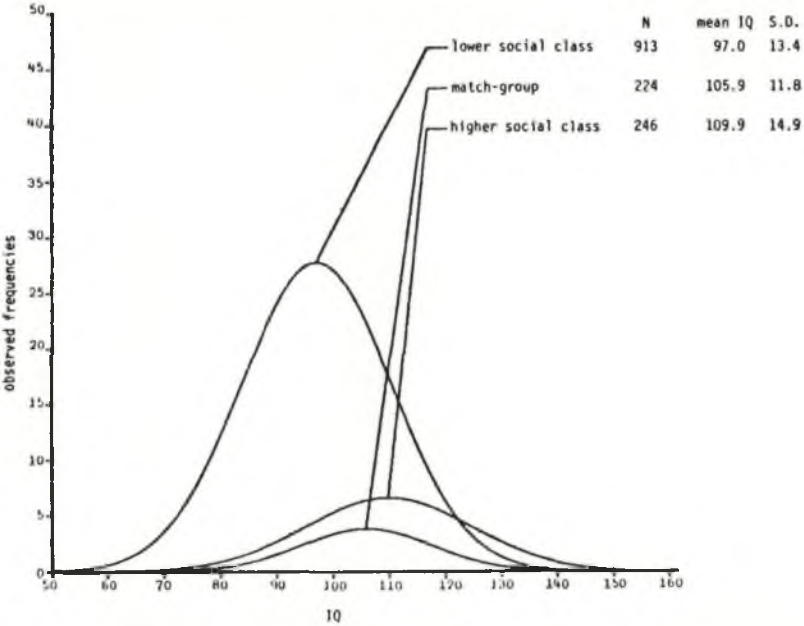
*Figure 1* Design of Social Class Matching Groningen-1 Data (excluding missing data)




Some remarks may be made about matching procedures in general[11] The original methodology for matched sampling in sociology has been developed by Chapin (1947) and Greenwood (1945). After more than twenty years of silence in matching research — mainly coinciding with the enormous development in multivariate statistics and advanced computers — recently the interest for matching designs has been growing. Theoretical research on matching is reported by Rubin (1976a, 1976b) and Rubin & Cochran (1973). The development of computers also shaped excellent conditions for the enormous sorting process in matching designs. Now a number of procedures and techniques are available for the construction of matched pair under a variety of conditions. The basic innovation was reported by Althauser & Rubin (1970). They discuss a matching procedure where one has an optimal chance of findings as many persons as possible with the same characteristics ('guaranteed variable caliper matching). This algorithm is elaborated and extended in a new series of programs[12] at the State University of Groningen by Haan (1975) and applied by Clason (1977) and Peschar (1975, 1977a, 1977b). The matched pairs construction for the research reported here was carried out by means of this program MATCHEN.

The focus in matched groups experiments is on *differences* in educational attainment and *not* on absolute level of education, since the composition of the sample is rather selective. In general the higher social class relatively low IQ's are matched with relatively high IQ's from the lower social class. In the ends of the IQ distribution almost no overlap exists between the lower class IQ's and the higher class IQ's: in these parts it is not easy to find matched pairs with the same IQ's sex and age. This situation is shown in Figure 2 for the IQ matching variable.

*Figure 2* Distribution for Social Class and Match Groups, Groningen-1 Data




Inspection of Figure 2 also reveals that the findings of these matched groups-experiment are 'conservative estimates' since only the intersection of the higher class and lower class IQ distribution is investigated. This Utopia — where the lower class children have the same IQ's as the higher class children — is unfortunately still far away. In the population the educational differences between the two social class groups will therefore be larger.

Summarizing the research model applied here, a number of matched groups are constructed, in such a way that an initial equal opportunity at the age of 10-12 years is realised. After having determined the educational level at age 18, one is able to conclude whether IEO exists as caused by the social class differences. It may be noted that IEO caused by intelligence, age and sex is removed in the matching process; the issue of heredity and environment is eliminated for this very reason.[13]

# 4 Data and Methods

## 4.1 Data for Holland

There is not many longitudinal data available on the educational and socio-economic career.[14] The longest span of time – 15 years – was covered in research carried out at the University of Groningen. On the basis of the 1958-1959 GALO-screening of pupils (N=2413) in the 6th grade of the elementary schools in the city of Groningen at the age of about eleven, 112 matched pairs could be constructed and were followed-up in 1973 (Peschar 1975). This GALO-screening (Groningen Elementary School Leaving Test) comprised an intelligence test plus information from parents and teachers, used to advise the student in making choices concerning future educational plans. The 15 year follow-up will be labeled as the *Groningen-1* dataset. Educational data is available for every year. As will be shown, a very systematic IEO situation was detected in this data.

One might notice that the educational system in the Netherlands at the beginning of the sixties has been changed considerably (OECD 1970 : 39). In about 1965 a new secondary educational system was introduced (Mammoth-law). Therefore the *Groningen-1* findings might be outdated. To test this assumption the matched groups-experiment was repeated in *exactly the same way* for the 1970 GALO-screening pupils in the city of Groningen (N = 1304). This data on 1970-1973 are called the *Groningen-2* data. Educational data is available on three years for the 155 matched pairs (Peschar 1975 : chapter 8). On the basis of the Groningen-1 and Groningen-2 data conclusions on IEO in both datasets, as well as a change in IEO during the 12 years between the two generations can be drawn.

## 4.2 Data for Sweden

Husén and coworkers at the University of Stockholm collected one of the most excellent databases in the field of socio-economic career. This so-called *Malmö*-data covers a period of thirty-four years and comprises an intelligence test for 1544 children at the age of ten in 1938 in the city of Malmö, plus additional information on family and social background for the same year. During several follow-up studies the data was extended with information on educational and occupational attainment. A complete description of field-work and some of the results are given by Husén (1969) and Fägerlind (1975). For the purpose of this paper from the Malmö-data matched pairs of higher and lower social class children are constructed for the year 1938 with the same educational opportunity (matching on sex, age, IQ). The data is completely longitudinal, so no additional follow-up is necessary. The criterion variable 'academic level' (Aclev) however is the final educational level at the age of 44. To reconstruct the educational level at 18, all the university studies

are excluded, assuming that no person started university before 18 and that there were only a few persons that were 'secondary path' students.[15]
Another interesting national dataset is collected Göteborg University by Härnqvist and Svensson. The Individual Statistics Project includes longitudinal information on educational characteristics of about 10.000 children originally tested in 1961 at the age of thirteen (Härnqvist & Svensson 1973). Several selective follow-ups have been undertaken for parts of the sample during the last years (1972, 1977). For the purpose of our analysis information on the complete population is necessary. This is the case for the data collected from 1961-1966, covering the age period from about 13 to 18 years. Unfortunately appropriate information is only available for boys (N = 4615). The basic data for 1961 enable us to match boys on the characteristics age and IQ. The criterion on which they can be compared is the educational level at 18. This data will be labeled INDSTAT.
In order to select matches from this national dataset comparable to the Groningen- and Malmö-pairs, a selection of the sample of N = 4615 was chosen. The two criteria for the selection were:

1 The regional group where the students lived in 1961 was restricted to schooldistrics where educational opportunities above the compulsory level existed (regional group codes 4-6).
2 The other datasets in this comparison are restricted to mediumsized cities; therefore only the three large cities, Stockholm, Göteborg and Malmö, plus the other cities were selected out from the INDSTAT sample. Unfortunately this city-information was only available for 1966, but it is believed that in combination with the foregoing restriction a good basis for comparison with the other datasets is established. The sample of 4615 boys thus was limited to N = 2152. The available intelligence test scores of 1961 were transformed to a deviation IQ with a mean of 100 and a standard deviation of 15. According to the directors of the INDSTAT databank, this IQ is highly correlated with a weighted General Intelligence Score, that was not available for our analysis.
   The final criterion for comparison is the educational level at age 18. Information is available in two ways; in a very detailed two-digit code developed by Härnqvist (1968; 65-66) and in a condensed form of four educational level codes (Härnqvist 1968; 66). The condensed code is applied here. As a check, analysis with the two-digit code has been carried out with exactly the same results (see also the Appendix).

On the basis of both Swedish datasets IEO comparisons can be made within Sweden. Since the criterion in both samples is the educational level at 18, it is also possible to compare outcomes with the *Groningen-1* data. In Table 3 the properties of the four samples are presented. In Figure 3 the datasets and the various possible comparisons are shown.

*Table 3* Survey of available Data, Variables and Criteria

| | Sample | Years | N = | Matches boys | Matches girls | matching variables | criteria for comparison |
|---|---|---|---|---|---|---|---|
| Holland | Groningen-1 | 1958-1973 | 2413 | 2x59 | 2x53 | sex, IQ, age | choice-1,[2] education at 18[3] |
| | Groningen-2 | 1970-1973 | 1304 | 2x88 | 2x67 | sex, IQ, age | choice-1,[2] |
| Sweden | Malmö | 1938-1972 | 1544 | 2x38 | 2x32 | sex, IQ,[1] age | education at 18[4] |
| | INDSTAT | 1961-1966 | 4615 (2152) | 2x129 | n.a. | IQ,[5], age | education at 18[6] |

1 matching actually on the regression corrected IQ for test reliability of $r_{xx} = .80$. (see also footnote 19)

2 coding (1) no secondary education or extended elementary school, VGLO (grade 7-8) (2) lower technical/vocational school, LTS/LHNO or lower agricultural school (grade 8-10) (3) junior secondary school ULO (grade 10) (4) girls secondary school, MMS or senior secondary school, HBS/Gymnasium (grade 11-12).

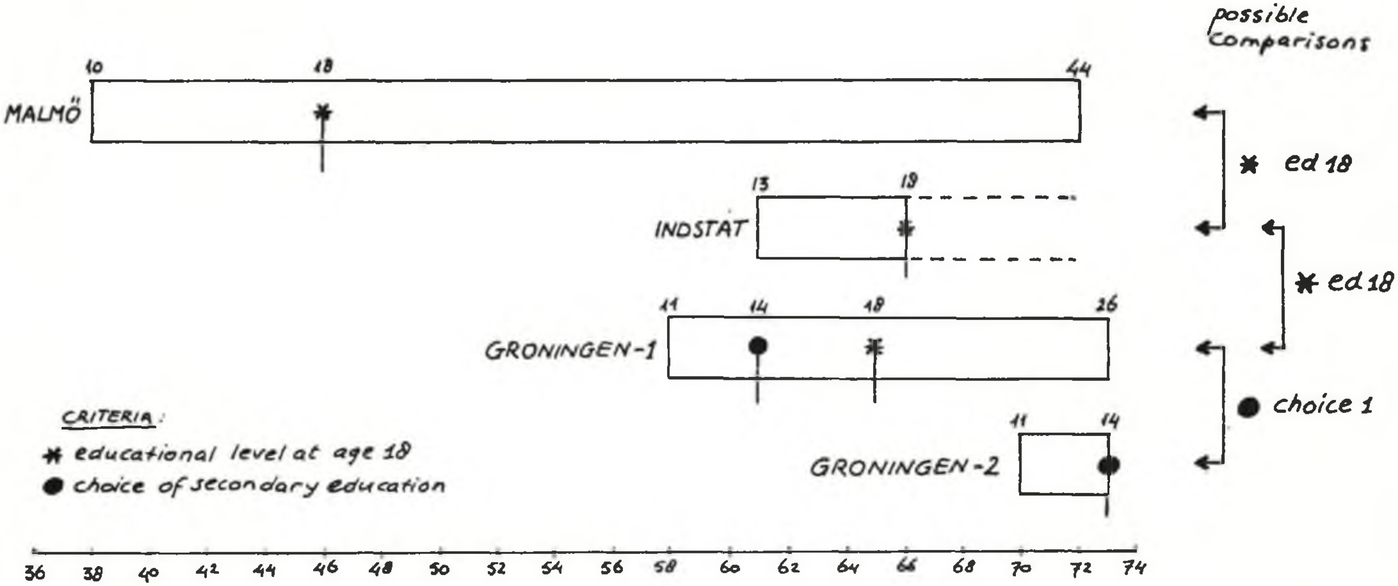
3 coding (1) elementary or extended elementary school (2) elementary or extended lementary school + special training (3) certificate lower technical/vocational school (4) certificate lower technical/vocational school + special training (5) certificate junior secondary school or some years of senior secondary school (6) certificate junior secondary school or some years of senior secondary school + special training (7) certificate senior secondary school or intermediate vocational school

4 coding (1) left folkskol awhen mandatory school age expired according to School Act § 48, which means that he individual dit not complete folkskola (2) six rr seven years of folkskola (3) folkskola followed by some post-school vocational training (4) realskola (academic high school graduate) or some gymnasium training but without matriculation examination (studentenexamen) (5) matriculation examination (studentenexamen) or some post-realskola vocational training like teacher training, economic or technical training.

5 Matching on IQ, according to a regression correction for testreliability of $r_{xx} = .87$ (the lowest value of reliability of the three subtests; Härnqvist 1968; 60) table 3.

6 coding: (1) compulsory education only (2) vocational education (3) lower secondary education of academic type (4) Gymnasium education.

*Figure 3* Datasets and possible comparisons within and between Holland and Sweden



### *4.3 Methods for analysis*

a. Differences between groups and within pairs.

There are a number of procedures available for the analysis of matched group experiments.[16] The basic finding is the (mean) difference *between* the two social class groups. A test of difference (Student t-test) is an appropiate means in establishing whether one can speak of systematic or accidental results. This implies that the dependent variable – the educational level at 18 – must be measured at interval level, while it is on ordinal level. Since much information on the pairwise matching is ignored, analysis *within* the pairs will provide new information. Per matched groups-experiment the differences within the pairs are presented: higher social class that have higher educational levels than lower social class children, the reverse situation and the number of matched pairs that end up equal. For reasons of comparison these numbers are presented as percentages. An appropriate statistical test will be the Wilcoxon-signed-rank-test, that allows for ordinal variables and includes the magnitude of the difference as well. (Blalock 1960; 206-209).

b. How critical is the IQ-region?

In this paper also some additional tests on interaction will be applied. If differences within the pairs have been discovered, it is necessary to know whether the size of the differences is dependent on the IQ-level of the pair. It may be assumed that the educational differences will be larger in the higher IQ-region and generally smaller in the lower region. The comparison between samples then becomes problematic if implicitely different IQ-regions are involved. The analytical procedure is as follows. Per pair differences in educational level at age 18 will be computed and correlated with the IQ-level of the pairs. If no influence of the IQ-region is to be accounted, the coefficient should be low and insignificant.

c. Comparing test-statistics.

Yet another problem of comparison between the samples has to be mentioned. The applied test statistics $z$ and $t$ are dependent on the sample size $N$. This is a handcap in accomparison with different sample sizes. In this paper the test-statistics will be corrected for the sample size by multiplication with a factor N1/N2.[17]

In order to improve comparability between the samples the test-statistics have been corrected for a 'hypothetical' standard sample size of N = 100. In this way the statistics can be directly compared; the significance level however is related to the original sample size.

## 5 Findings

The present analysis is limited to *boys,* since for one of the four included datasets no information on educational career has been collected for girls.

One may find this a limitation; it may be assumed that IEO may have declined particularly for girls from lower social classes. This hypothesis cannot be tested here.

In the following, differences *within* datasets will be presented (between the higher and lower social class groups) as well as *between* datasets (to compare changes in the educational systems).

Space limitations prevent an extensive discussion of the findings for each dataset separately. In the following sections the main findings are presented. In order to be able to compare the findings between the datasets, the dependent variables have been recoded into four categories, listed in more detail in the Appendix.

### *5.1 IEO and changes in IEO in Holland*

In the Groningen-1 dataset 59 pairs of boys could be constructed. In the Groningen-2 dataset 88 pair of boys could be found. The first criterion of comparison is the choice of secondary school (choice 1) that is made at the age of about 12. There is a strong stratification in this ranking. It may be recalled that the pairs are matched for their situation at the age of 11, before the choice of a secondary school is made.

*Table 4* Test Results for Groningen-1 and Groningen-2 Matched Pairs of Boys; Choice of Secondary Education (choice 1)

A: Differences per Pair and Wilcoxon Z

| Sample | Criterion in | N | difference in % | | | Wilcoxon | standard |
|---|---|---|---|---|---|---|---|
| | | | L<H | L = H | L>H | Z | test value for N = 100 |
| Groningen-1 | 1961 | 2x59 | 58 % | 32 % | 10 % | 3.95* | 5.14 |
| Groningen-2 | 1973 | 2x88 | 54 % | 28 % | 18 % | 3.65* | 3.89 |

* $p < .001$

B: Means per Social Subgroup and Student t

| Sample | Criterion in | N | educational choice | | | | Student | standard |
|---|---|---|---|---|---|---|---|---|
| | | | $X_h$ | $X_l$ | $SD_h$ | $SD_l$ | t | test value for N = 100 |
| Groningen-1 | 1961 | 2x59 | 3.17 | 2.58 | .87 | .77 | 5.10* | 6.64 |
| Groningen-2 | 1973 | 2x88 | 3.17 | 2.63 | 1.02 | .96 | 4.26* | 4.54 |

* $p < .001$

As may be seen from Table 4A, within the Groningen-1 data, there is a strong tendency for higher class children to choose a higher educational level than their lower class matches (58 %). In 32 % of the cases they choose the same level, while in only 10 % of the cases the lower social class children choose a higher level. The Wilcoxon Z value indicates the very systematic trend in this respect, also accounting for the size of differences within the pairs (that are not recognizable from Table 4A). From Table 4B it can be concluded that the mean[18] difference between the higher and lower social class groups is 3.17 – 2.58 = .59 educational points (on a scale from 1-4). From both the very high test statistics Z and t we may conclude that there is a very low statistical chance that these findings are artificial ( $p < .001$). Indeed one can speak of strong situation of IEO in the Groningen-1 data.[19]

The findings for the Groningen-2 data – also presented in Table 4A and 4B – indicate that the mean difference between the social class groups 12 years after the Groningen-1 situation has hardly changed (3.17 – 2.63 = .54). Only the variance has increased somewhat, which is reflected in the t statistic. In Table 4A however, some more children from the lower social class group have chosen a higher level than their higher class match (18 %). The high amount of 54 % on the contrary indicates that still many higher class children have chosen a higher educational level than their lower class matches.

The Wilcoxon-Z value is very significant. After a correction for the sample size as described in the foregoing section, the Z- and t values for the Groningen-2 data still are of the same magnitude as the Groningen-1 statistics, indicating that not very much has been changed in the twelve years between the two datasets. This is even more surprising if one recalls that in this period a completely new educational system in Holland was introduced. One of the implicit purposes of this reform was improving the equality of educational opportunity, apparently without much succes so far.

The choice of the secondary schooltype – as is choice 1 – may be viewed as a preliminary indicator for the educational career. Unfortunately no further educational information is available for the Groningen-2 data. But the figures on the educational level at age 18 for the Groningen-1 data show clearly that the social differences only become greater after the first educational choice at the age of 12.

This figures are presented in Table 6; the discussion however will be postponed until we compare the Groningen-1 data with the INDSTAT matched boys (section 5.3).

### *5.2 IEO and changes in IEO in Sweden*

On the basis of the Malmö data a number of 38 matched pairs of boys could be found. Though information is available for their whole educational career up to age 44, for reasons of comparison we had to choose the educational level at age 18 as the main criterion (see section 4.2). Findings on IEO in this data are presented in Table 5.

*Table 5* Test Results for Malmö and INDSTAT Matched Pairs of Boys: Educational Level at Age 18

A: Difference per Pair and Wilcoxon Z

| Sample | Criterion in | N | difference in % L<H | L = H | L>H | Wilcoxon Z | standard test value for N = 100 |
|---|---|---|---|---|---|---|---|
| Malmö (coding 1-4) | 1946 | 2x38 | 71 % | 24 % | 5 % | 4.19* | 6.80 |
| INDSTAT (coding 1-4) | 1966 | 2x129 | 60 % | 29 % | 11 % | 6.47* | 5.70 |

* $p < .001$

B: Means per Social Subgroup and Student t

| Sample | Criterion in | N | educ. level at 18 $X_h$ | $X_l$ | $SD_h$ | $SD_l$ | Student t | standard test value for N = 100 |
|---|---|---|---|---|---|---|---|---|
| Malmö (coding 1-4) | 1946 | 2x38 | 3.32 | 2.05 | 1.02 | .96 | 6.15* | 9.98 |
| INDSTAT (coding 1-4) | 1966 | 2x129 | 3.52 | 2.67 | .90 | 1.07 | 8.26* | 7.27 |

* $p < .001$

From these findings we may conclude that for the Malmö generation at the age of 18 strong educational differences have been established. In only 24 % of the cases the higher and lower social class matches end up equal. But in 71 % of the cases the higher class child ends up with a higher educational level. In Table 5B is indicated that also the mean levels of education differ greatly for the social class groups. The test statistics Z and t indicate that there is only a very low chance of accidental results.

These findings have to be viewed in the historical context of the educational policy at that time in Sweden. For the Malmö generation (born in 1928), it is unlikely that this policy of educational equality has been effective. Therefore we need a comparison of these findings with more recent data on the Swedish educational situation. The Göteborg INDSTAT data provide an excellent opportunity in this respect.

From the INDSTAT data a number of 129 matched pairs of boys could be found. As can be seen from Table 5A the educational opportunity for this generation has improved somewhat, compared to the Malmö generation. Nevertheless the magnitude of the test-statistics indicate that there is no systematic in the educational inequality at all. The figures of Table 5B indicate the same when we compare the standardised test-statistics.

Apparently our conclusion for this section must be that the influence of the immensely changed educational system in Sweden during the last twenty years is not very much reflected in the educational outcomes at the age of 18. Two additional remarks may be useful at this moment.

In the first place our conclusion is restricted to *educational* equality. No information is presented with respect to the occupational or income situation. The comparison would then be hindered by the separate influence of the occupational structure, the labor market and the income/tax systems.

In the second place one may wonder whether the 1961-1966 situation as presented above may be superceded by more recent school reforms in Sweden. There is no evidence for such optimism. A second national follow up in the Individual Statistics Project has been carried out by the Institute of Education of the University of Göteborg for the schoolgeneration of 13-years olds in 1966. Therefore identical data are available for a period of 5 year later; in between again educational reforms have been introduced. Preliminary results published by Reuterberg indicate that no substantive changes have taken place when comparing the 1961 and 1966 national surveys (Reuterberg 1968. See als Svensson 1971; 40-42).

### *5.3 Comparing IEO Holland and Sweden*

According to Figure 3 (page 283) we intended also to compare IEO between Holland and Sweden, as far as concerned with the educational level at age 18. In Table 6 the available data for Groningen-1 matches are presented. As was mentioned, the educational differences between the higher and lower social class group at the age of 18 are even stronger than they are at the age of about 13 to 14 years (Table 4). This is reflected in the very high scores of the test-statistics Z and t (respectively 5.16 and 7.45!).

When we compare this situation with the already presented figures from the INDSTAT data, (Table 5) there is a striking similarity in these findings. Indeed, the educational chances for a higher class boy are somewhat less favourable in Sweden then they are in Holland (60 % versus 69 %) and conversely the educational chances for lower class boys in Sweden are somewhat better than they are in Holland. The IEO tendency however is *very systematic* in favor of higher class children in both countries.

Furthermore we should keep in mind that these findings are derived from matched groups of boys that an *equal educational opportunity at the age of about 11-13 years,* before entering the (higher) secondary schoolsystem!

*Table 6* Test Results for Groningen-1 and INDSTAT Matched Pair of Boys; Educational Level at Age 18

A:Differences per Pair and Wilcoxon Z.

| Sample | Criterion in | N | difference in % L<H | L = H | L>H | Wilcoxon Z | standard test value for N = 100 |
|---|---|---|---|---|---|---|---|
| Groningen-1 (coding 1-4) | 1965 | 2x59 | 69 % | 29 % | 2 % | 5.16* | 6.71 |
| INDSTAT (coding 1-4) | 1966 | 2x129 | 60 % | 29 % | 11 % | 6.47* | 5.70 |

* $p < .001$

B. Means per Social Subgroup and Student

| Sample | Criterion in | N | educ. level at 18 $X_h$ | $X_l$ | $SD_h$ | $SD_l$ | Student t | standard test value for N = 100 |
|---|---|---|---|---|---|---|---|---|
| Groningen-1 (coding 1-4) | 1965 | 2x59 | 3.44 | 2.35 | .70 | 1.03 | 7.45* | 9.70 |
| INDSTAT (coding 1-4) | 1966 | 2x129 | 3.52 | 2.67 | .90 | 1.07 | 8.26* | 7.27 |

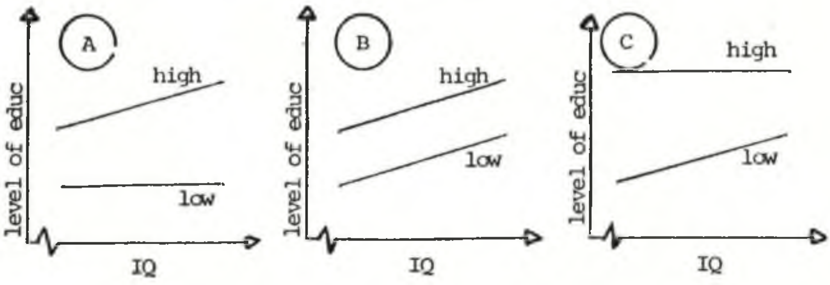
* $p < .001$

The size of the test statistics moreover is extremely high and of the same magnitude in both samples, indicating a very strong social mechanism.

### *5.4 How critical is the IQ-region?*

As mentioned above, a supplementary check on interactions between differences in educational criterion and IQ level of a pair should be accomplished. In principle three situations may occur, as expressed in Figure 4.

*Figure 4* Schematic Presentation of Interaction Effects in Matched Groups Experiments



In situation A differences between the two social class groups increase with rising IQ (as reflected in a positive correlation coefficient). This indicates that higher class high-IQ children have an *extra* opportunity in their educational career. In situation B, the educational differences occur at all levels of IQ and are not influenced by the IQ level (resulting in an insignificant and low correlation). In situation C however, one may detect the standing influence of social class, quite different for the two subgroups.

When comparing different datasets we must be sure that we do not compare different IQ regions, especially in the situations A and C. The correlations between educational difference and IQ are presented in Table 7.

*Table 7* Spearman Correlations and Test of Linearity for IQ and Difference in Educational Level. Matched Pairs of Boys

| Sample | N | IQ-region | Correlation r | Linearity F |
|---|---|---|---|---|
| *Choice for secondary School* | | | | |
| Groningen-1 | 2x59 | 86-130 | .02* | .94* |
| Groningen-2 | 2x88 | 84-129 | -.10* | .88* |
| *Level of education at age 18* | | | | |
| Groningen-1 | 2x59 | 86-130 | -.02* | .76* |
| Malmö | 2x38 | 65-129 | .22** | 1.38* |
| INDSTAT | 2x129 | 59-134 | -.07* | .94* |

* n.s.
** $.05 < p < .10$

From this Table we may conclude that the correlations indicate no significant interaction of the educational differences with IQ. A slight resemblance of the Malmö data with situation A must be mentioned. In general we may conclude that there is no systematic influence of the IQ region where the matched pairs are found. The educational *differences* are largely independent of the IQ level. A supplementary test on linearity supports this conclusion.

## 6 Discussion

As has been mentioned, this presentation of comparable matched groups-experiments was limited by the availability of relevant datasets.

A main problem in every comparative research project is the comparability of indices and criteria. For the present research the criteria applied for the selection of the higher and lower social class groups are relevant as well as the education criteria. In Appendix the these criteria are documented more fully, enabling the conclusion that a relatively high comparability has been achieved.

Another remark may be made (again) about the selective character of the experiments. Since only the cross-section of lower and higher social class children can be matched on relevant characteristics (see figure 2) an *under-estimate* of the educational difference is presented. Therefore the results of semi-experiments can be *generalized* towards larger populations, though they do not present reprentative figures.

Finally, the application of matched groups-experiments is much less costly than the normal large sample surveys. Nevertheless in such experiments many variables can be controlled in the matching procedures, enabling one to concentrate only on relevant subgroups. Especially in the case of educational opportunity one might select other contrast groups (boys/girls, urban/non-urban, high vs low achievers, black/white, etc.).

## 7 Conclusions

In this paper an attempt has been made to investigate Inequality of Educational Opportunity (IEO) by means of a sequence of matched groups experiments. Within each of these semi-experiments the existence of a certain amount of IEO has been determined. Semi-experiments for various moments or places — conducted in the same way — may provide information on variations from time to time or place to place.

For the educational situation in Holland one experiment over 15 years (1958-1973) was conducted, showing a large amount of IEO for boys in their career from 11 to 18 years. A replication (1970-1973) showed that — even after a change in the educational structure — this amount of IEO has hardly changed.

On the basis of available data for Sweden (1938-1972) also a semi-experiment was designed and undertaken in a similar way as for Holland. The large amount of IEO found in this data however, may be typical for the period under study and be superceded by the many educational reforms carried out since. Therefore more recent data from Sweden (the Individual Statistics Project 1961-1966) were analyzed, showing that IEO in Sweden had almost not diminished.

On the basis of the presented information is is also possible to compare IEO differences between Holland and Sweden.

There is a very strong resemblence of the educational situation and opportunity at the age of 18, in both Holland and Sweden, though the Swedish boys may have had slightly better educational chances. The high amount of IEO, as reflected in the extremely hight test-statistics, suggests however that more than twenty years of educational policy and reforms in Sweden, has not paid off so much as one might expect.

Our main conclusion of this sequence of matched groups experiments must be, that a policy with high priority on equal educational opportunity may be related with only a very small diminishing rate of IEO.

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## Appendix

On the comparability of the social class and educational criteria between the four datasets.

a the social class criterion.

1. In both the Groningen-1 and -2 datasets the same criterion for the division into social class groups was applied. The *occupationa*l coding scheme developed by the Institute for Applied Sociology at the University of Nijmegen (ITS) was applied: for details see ITS 1973: 16). Farther's occupation for the two upper categories (5 = middle level employees and 6 = higher occupations) was determining for the higher class group, the two lowest categories (1 = unskilled labor, 2 = skilled labor) for the lower social class group. In the Groningen-1 data the proportion of high and low social class group is about 12 % vcs 46 % of the total population.
2. In the Malmö data two indicators for social class are available, namely father's education and an SES-score (see Fägerlind 1975: 46-47). The SES-score is a composite variable containing different information (father's education, 1937 family income, number of children at home and appearances in the social wellfare register of the Malmö schools). It was decided that the information on Father's Education was the best measure of social class to compare with the dutch occupational criterion, that has a high correlation with educational level as well. The two social class groups were composed of the upper two codes of father's education (5 = academic high school graduate/realskola or some years of gym-

nasium, and 6 = university matriculation standing or higher academic education) and the two bottom codes (1 = six or seven years of schooling not followed by some on the job training, 2 = the same level plus some limited additional job training). The proportion of higher and lower social groups is about 8 % vs 43 % of the total population.

3. In the INDSTAT-data the occupational as well as educational level for the father is available. Moreover two composite scores for social group and social background have been constructed (see Härnqvist 1968: 71 ff and Härnqvist & Svensson 1973: 7). Inspection of the detailed codes and the relative frequencies led us to the choice for the social group-code, that comprised the job category as well as the educational level of the father. The upper social group consisted of social group A (in general teachers, academics, army officers and directors of factories etc. mainly with a studentexamen or academic examen); the lower social group consisted of social group E (skilled and non-skilled workers with only lower education = folkskola).

The extreme social groups as they are chosen in this dataset have strong resemblance with respect to the social group criterion for the Groningen data. In the INDSTAT data the proportions of the higher and lower groups is 8 % vs 47 % of the total population.

b the educational level at age 18

1. In the Groningen-1 data set the seven categories are condensed into four, in order to make comparisons possible with the INDSTAT criterion. The available information – as presented in Table 3 – was recoded as follows: (1) only compulsory education (codes 1 + 2), (2) vocational education (codes 3 + 4); (3) lower secondary education (codes 5 + 6); (4) higher secondary and gymnasium education (code 7).

2. The criterion available for the Malmö data was also recoded, taking together the codes 1 and 2.

3. The INDSTAT educational coding into four categories was applied. As mentioned in the text a much more detailed code was available. For reasons of reliability the analyses were also carried out with this 21-category variable.

The findings are almost identical ($Z = 7.13$, $t = 8.99$).

As a check all the analyses for the Groningen 1 and Malmö data were compared with the findings based on a non-recoded educational level. The findings are similar, with only slightly differing test statistics. (Groningen 1 $Z = 5.36$; $t = 7.49$; Malmö $Z = 4.19$; $t = 6.15$).

## Notes

1 It is not the intention of this paper to *describe* the educational systems of both countries. For a review of main policy issues see OECD 1969a, 1970.

2 In 1971 taxes as a percentage of the National Income were: Sweden 44.7 %; Holland 41,4 % (Tinbergen 1975: 410). For the periode 1973-75 these figures are: Sweden 42.6 % and Holland 44.8 % (OECD 1977: 310). Tinbergen concludes in his article that social security and income distribution in the Netherlands are close to those of the Scandinavian countries, just as the tax systems are (Tinbergen 1975: 404-409).

3 For 1970 the costs of social security were respectively 20.0 % for Holland and 19.1 % of the G.N.P. for Sweden (Huppes 1977: 81).

4 Recently, however, many research projects were started. See for instance the

report on Educational Research in the Netherlands: (SVO, 1976).

5 Since December 1977 a center-conservative coalition was established by Van Agt after more than half a year of negotiations. There is no emphasis on social and educational equality in the statements of this coalition.

6 Huppes in his book on income distributions, shows that more income equality had been established during the left-center coalition of Den Uyl (Hupper 1977: 84-91).

7 Another problem is that not all the participating countries were involved in all the projects (Schwille & Marshall 1975: 6).

8 For similar remarks on the social class index see Husén (1975: 21-25).

9 See for instance Elias (1977).

10 A further critique is expressed by Hauser (1976: expecially p. 911 etc.).

11 For a more extended treatment of matching procedures see Peschar (1977a, 1977b).

12 One of the important features of this MATCHEN program is that — in contrast to Althauser & Rubin — a *complete list* of matched pairs is produced, with a certain precision. This precision can be changed by means of a program parameter. Furthermore two ways of matching are optional as well as various strategies in matching (start with the 'easy' cases or the 'difficult' ones). The Program is written in ALGOL for CDC Cyber computers.

13 It is not argued here that the issue on heredity/environment is not an important one. The matching design, howevers does not allow any conclusion in this respect.

14 In 1965 a large national cohort of 3000 children was questioned and followed-up *partly* by the Institute for Applied Sociology (ITS) at the University of Nijmegen. In 1978 again a data collection is planned for the whole sample. Results of the second phase of the project (only for secondary education in 1974) have just been published (Collaris & Kropman 1978).

15 In German 'Zweiter Bildungsweg', to indicate students that enter the educational system again after (some) years of labor market participation.

16 An extended treatment in Peschar 1977b.

17 Two other strategies can be applied as well.
The first alternative is only possible when the criteria have been measured on the same educational scale. In both samples the lowest social class group gets 'extra educational points' and the test statistics are computed again. After some experimentation it can be determined how many 'extra educational points' have to be given to the lower class group until the test statistics (and thus the differences between lower and higher social class groups) become insignificant. We then know how large the educational difference between the matches is *at least* )for an application see Peschar 1975, chapter 8).
If criteria cannot be measured on the same scale (as is the case here) another strategy may be convenient. From the largent matched group a number of random samples can be drawn equal to the size of the comparative group. The means of the test statistics resulting from a number of such random samples can be compared, since the number of observations is standardized now. This strategy leads empirically to the same figures as the correction by V N1/N2.

18 A more precise median estimate would take much more time and provide essentially the same information. A median test shows the same results.

19 In Holland, after the publication of the first results (Peschar 1975) an intensive discussion has taken place about the influence of the reliability of matching

variables on the outcomes of matched groups experiments. Especially the reliability estimates of the IQ-test were supposed to cause a 'regression-to-the mean effect'. In this place it will suffice to mention that for the Groningen-1 and Groningen-2 datasets *no* correction for test reliability of IQ can be made, because the IQ was the main determinant in the counseling process (and thus acted as a *label)*. In other cases (Malmö and INDSTAT) a correction for test reliability seems to be appropriate.

We do not want to go into more detail here, an overview of arguments pro and contra empirical evidence are presented in Peschar (1977b 18-23).

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