Involvement of German students in NS organisations based on the archive of the Reichsstudentenwerk

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INVOLVEMENT OF GERMAN STUDENTS IN NS ORGANISATIONS BASED ON THE ARCHIVE OF THE REICHSTSTUDENTENWERK (1)

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Abstract: Sample data from the Reichsstudentenwerk collected from 1933 to 1942 are used to make inferences on the percentage of students involved in Nazi-Organisations. On the basis of available census data the extent of representativity of this body of data for the whole student population is checked. Inferences can only be drawn with great care. Involvement of students in Nazi-Organisations was found to be very high. Of all the variables from the data set only a few - sex, birth cohort and fathers' status - prove to be important for determining Nazi affiliation. To check for the interrelations of the explanatory variables logistic analysis of variance is used. Finally the method of iterative proportional fitting is applied to estimate the Nazi involvement of the whole student population by controlling for the marginals of the sample not found to be equal in proportion to the total population.

1. INTRODUCTION

During the last ten years, there has been a growing interest in the relationship of German students in the Weimar republic as future elite of the nation on the one hand and right-wing radicalism, especially the NSDAP and its formations, on the other hand. This interest has concentrated on various points, for example:

- on the rise of the NS students movement, organized in the Nationalsozialistischer Studentenbund (NSDStB) (Faust, 1973),

- on speculations about the political convictions of students (Kreutzberger, 1972),

- on the attempt to explain by social and economic factors what made the NSDAP so attractive to students of that time (Kater, 1975).

All of these examples are restricted to the period from 1921 to 1933.

In this paper I should like to follow two purposes. In the first place, a sociography of German students from 1933 - 1942 is attempted on the basis of individual data from the German Reichsstudentenwerk and of census data. My special interest is to find out to what extent German students of this period were involved in NS-organizations and how this might be explained by variables like social background, type and size of university or college, chosen subject of study etc. The focus of the analysis is on the structural aspect. As I am only a lay-historian, I will not pretend to be able to

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demonstrate the historical evolution of this envolvement of students, or the psychological Factors behind the social structures.

In the second place, I should like to show the methodological difficulties appearing in such an analysis and to apply a more sophisticated method of data analysis to overcome these difficulties. Use is made of generalized linear models in analysing and reconstructing multidimensional contingency tables to assess the effects of independent variables on a nominally scaled dependent variable and to show a way how to estimate the total number of students participating in NS-organizations.

2. THE DATA OF THE REICHSSTUDENTENWERK

2.1. DESCRIPTION OF THE DATA

The individual data, on which the analysis is based, were sampled from the archive of the Reichsstudentenwerk (RSW), stored in the Federal republic of Germany's Bundesarchiv in Koblenz. Jarausch and Kater discovered this data set and saved it from being shredded. From 1923 on, the Reichsstudentenwerk gave loans to students which could be slowly repaid at rather low rates of interest between 3 and 5%. (2) Officials of the Reichsstudentenwerk wrote or typed the amount of the loan and some characteristics of the student on a card or a piece of paper.

After the war, these cards were stored in the Bundesarchiv. When Kater and I first glanced over the cards in 1980, we discovered great differences in the information content of the cards. Some of them, especially the older handwritten ones, contained hardly any information besides the name, but others had the profession of the father, place of birth, marital status and - since 1933 - membership in a NS organization written on them. Before analyzing the whole set of about 19,040 cases, we decided to draw a sample by extracting and copying every 20th card which yielded a sample size of 900 cases after eliminating 52 bad copies. From the cards, a list of variables - shown in the Appendix, page 1 - was derived.

The handwritten cards contain practically no information besides name and university. They were used only until 933. Since most of the cards had been written from 1933 onward, we have much better information on the period after 1933, and the analysis therefore concentrates on students, who received their first loan in 1933 or later.

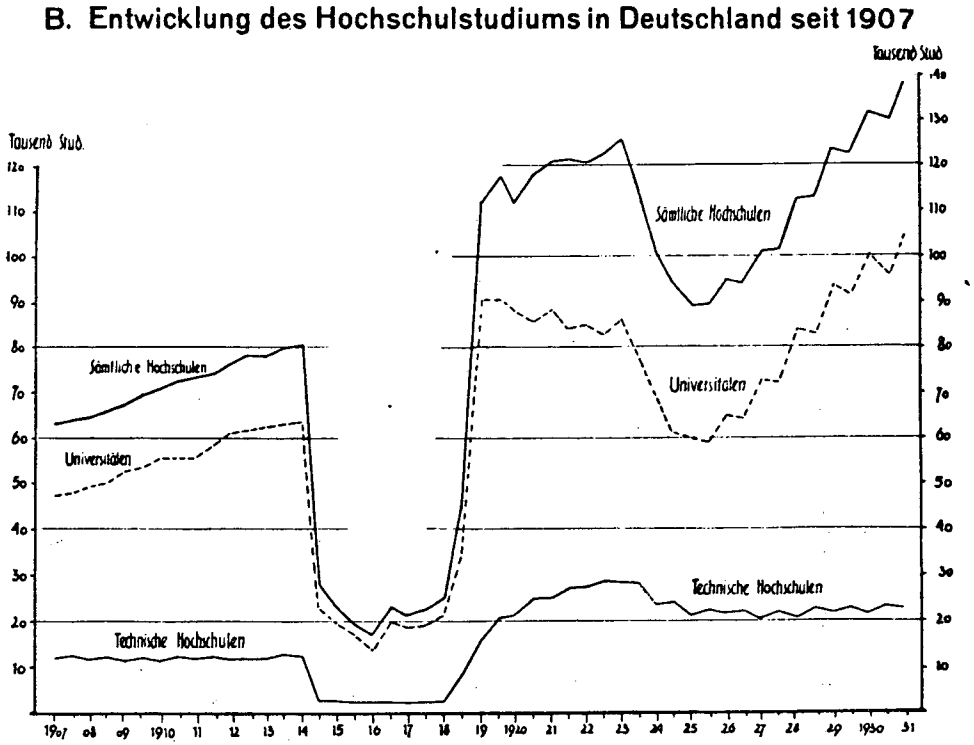
Before discussing the involvement of German students in NS-Organisations, we have to compare the data of the RSW with census data to find out how representative the data are for the totality of German students during this period of time.

2.2. SOCIOGRAPHY OF GERMAN STUDENTS BY COMPARISON OF THE RSW AND CENSUS DATA

2.2.1. THE NUMBER OF STUDENTS

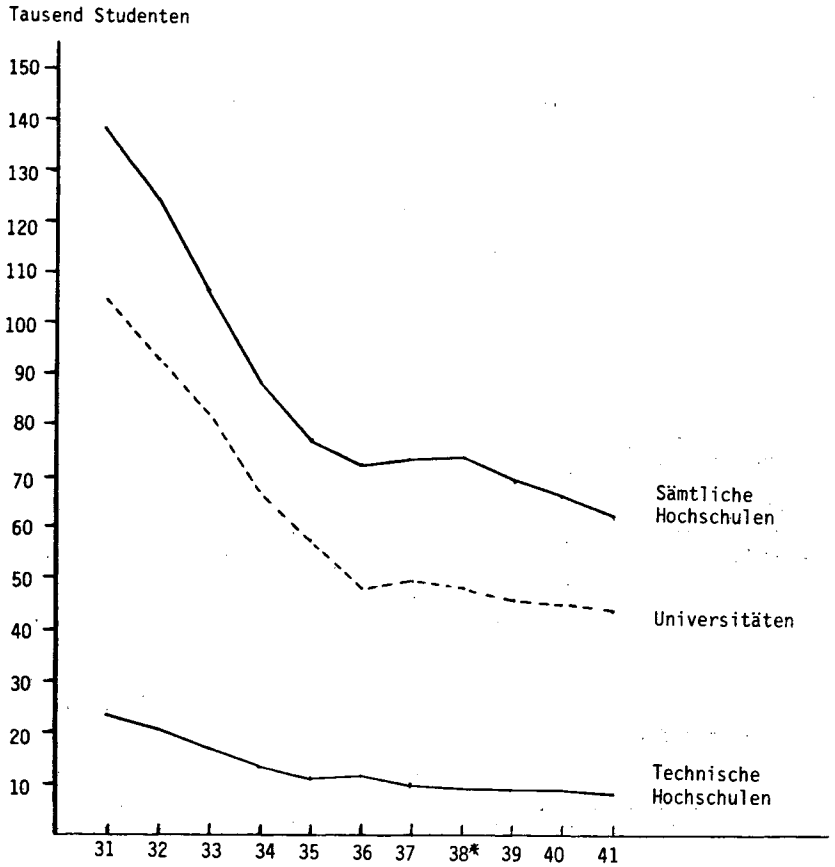
The development of the number of students in German universities is characterized by figures 1 and 2.

Fig. 1: Developement of student numbers from 1907 to 1931



Source: Deutsche Hochschulstatistik, Winterhalbjahr 1931

Fig. 2: Developement of student numbers from 1932 to 1941



Source: Deutsche Hochschulstatistik 1931 - 1936
Statistische Jahrbücher für das Deutsche Reich 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942
(Values between 1937 and 1940 are interpolated)

* Austrian students included from March 1938

The most striking feature of these two figures is the sudden rise of numbers from 1925 to 1931 and the equally sharp decrease from 932 to 1935. Kater (1975) has argued convincingly that from 1925 on students could hardly find work, so there were a great many students delaying their studies and remaining a student. Also there was a greater percentage of people going to university after having attained their Abitur (High School diploma) because, owing to the unemployment problem, there was nothing else to do. The decrease has the following causes: first, decreasing birth cohorts 18 years before; second, the "old" students finally left the universities and, third, the limits on the number of students in big universities issued by the minister of education in the first year of NS rule in Germany, but abolished again one year later.

2.2.2. TYPE OF UNIVERSITY AND SEX OF STUDENTS

German universities were traditionally divided into universities proper, technical colleges (TH = Technische Hochschulen) and other types of college (e.g. theological, educational, business administration and art colleges). During the NS rule, 13 educational colleges for grammar school teachers were founded, which attracted a growing number of students. While universities and technical colleges decreased in student numbers, we find an increase from 7,694 students in other colleges in 1933 to 13,781 in 1937.

This is also illustrated by the distribution of sex of students on the different university types for the periods 1933 to 1938 and 1940 to 1941.

Table 1: University type by sex (census data)

1933 - 1938	male	female	Σ
University	610 .838	118 .162	728
Technical college	140 .966	5 .34	145
Others	155 .914	11 .086	127
Σ	866	134	1000

average number of students in this period 83 186.

1940 - 1941	male	female	Σ
University	521 .753	170 .247	691
Technical college	126 .935	9 .065	135
Others	93 .532	82 .468	175
Σ	739	261	1000

average number of students in this period 64 735.

Source: Stat. Jahrbücher 1933, 1934, 1935, 1936, 1937, 1940, 1941/42

The percentage of women in the universities was rather low; the increase from the first period to the second is on the one hand due to the impact of World War II, on the other hand caused by the implementation of educational colleges for grammar school teachers, a professional field discovered by German women at this time. The percentage of women visiting the technical colleges is extremely low.

Table 2: University type by sex (RWS data)

1933 - 1938	male	female	Σ
University	225 94.5	13 5.5	238 70.8
Technical colleges	47 100.0	0 0	47 14.0
Others	46 90.2	5 9.8	51 15.2
Σ	318 94.6	18 5.4	336 100.0

1939 - 1942	male	female	Σ
University	106 89.1	13 10.9	119 60.7
Technical colleges	34 94.4	2 5.6	36 18.4
Others	35 85.4	6 14.6	41 20.9
Σ	175 89.3	21 10.7	196 100.0

Comparing table 1 (census data) with table 2 (RSW data) shows a difference in both periods for the distribution of women. Female students are not sufficiently represented in this data set, especially in the universities in the first and second period and in other colleges in the second period. (3)

The difference in types of university is - at least for the first period - negligible.

In my opinion, there are two reasons for this difference:
First, the student receiving a loan is quite a few years older than the average student, the mean age being 25,9 years in the first and 26,5 years in the second period in the RSW data. Students apparently applied for loans rather at the end of their study, so the RSW represents an older part of students with a lower percentage of women than the totality of students, given an increasing number of female first-term students.

Second, as table 3 demonstrates, people with higher social status - the first three categories in table 3 - send their daughters to college more often than those from middle or lower strata of society (4); the latter show a significantly stronger representation in the sample than they are expected to do according to chance; this will be shown in table 4.

Table 3: Father's status by sex (census data)

	male	female	Σ
Nobility and propertied classes	9 993 .846	1 823 .154	11 816
Officials with college education	10 308 .784	2 847 .216	13 155
Old middle class	16 313 .908	1 647 .092	5 292
New middle class	28 627 .875	4 074 .125	32 701
Working class	3 011 .939	196 .061	3 207
Σ	72 539 .862	11 592 .138	84 131

Source: Deutsche Hochschulstatistik, Band 14, Winterhalbjahr 1934/356

There is no need to test for independence, since table 4 is the total population.

2.2.3. SOCIAL STATUS AND SUBJECT OF STUDY

Two more variables could be compared with census data from the same period, i. e. father's status and subject of study. The first comparison is shown in table 4.

This result is not consistent with tables 4 and 5 published by Kreutzberger (1972, pp. 59, 60), showing for the year 1928 the bivariate distribution of father's social status by subject of study for the Reich and the students of the university of Freiburg. The reasons for this inconsistency should be sought in the size of the sample of the RSW data as well as in the extreme variation of subject preference shown before.

The relationship between sex and subject of study is shown in table 6, demonstrating the preference of female students for liberal arts and their avoiding technical subjects.

Table 6: Sex by subject of study in the period 1933 - 1942

	male	female	Σ
Theology	20 4.1	0 0	20 3.7
Law & Economics	107 21.7	7 17.1	114 21.3
Medicine, Pharmacy	143 29.0	10 24.4	153 28.7
Sciences	50 10.1	5 12.2	55 10.3
Liberal Arts	50 10.1	17 41.5	67 12.5
Architecture	50 10.1	0 0	50 9.4
Engineering	43 8.7	1 2.4	44 8.2
Others	30 6.1	1 2.4	31 5.8
Σ	493 92,3	41 7.7	534 100

χ^2 38,91 7 df α = 0

Cramer's V = .26995

Comparing official census and RSW data, we find significant differences in the distributions of sex, father's status, age and subject of study. Therefore the RSW sample must be used with caution for inferences about NS involvement of students made in the next section.

3. INVOLVEMENT OF STUDENTS IN NS ORGANIZATIONS

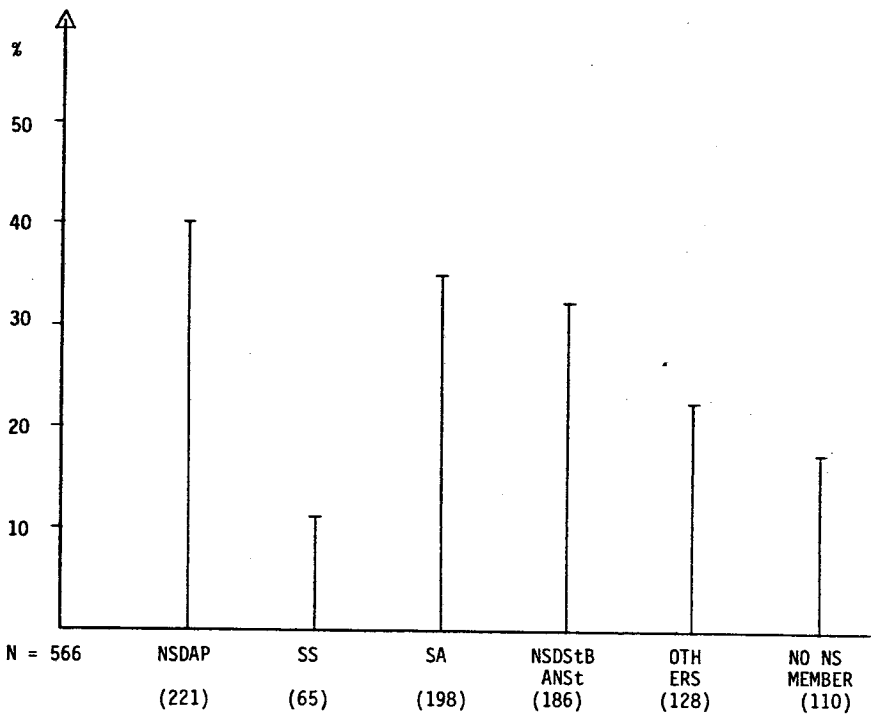
3.1. ASSESSMENT OF NS INVOLVEMENT

From 1933 onward, the RSW cards contained information about whether a student receiving a loan was a member of one or more NS organizations or not and, if yes, in which organization and since when. Therefore, we restrict ourselves to the data collected from 1933 to 1942. As indicators for NS involvement, we used the following variables:

1. Membership in NS organizations. Since there was often more than one membership per student, we subdivided into three variables, first membership,
2. second membership and
3. third membership
4. number of memberships
5. the dichotomy: no membership vs. membership
6. the dichotomy: no membership or membership in one of the less important organization like HJ or BDM vs. Membership in one of the more important formations like NSDAP, SS, SA or NSDStB.

Since SS and SA membership exclude each other in the sample and since both were always coded as first membership, the next figure shows the total number of SS and SA members in the sample.

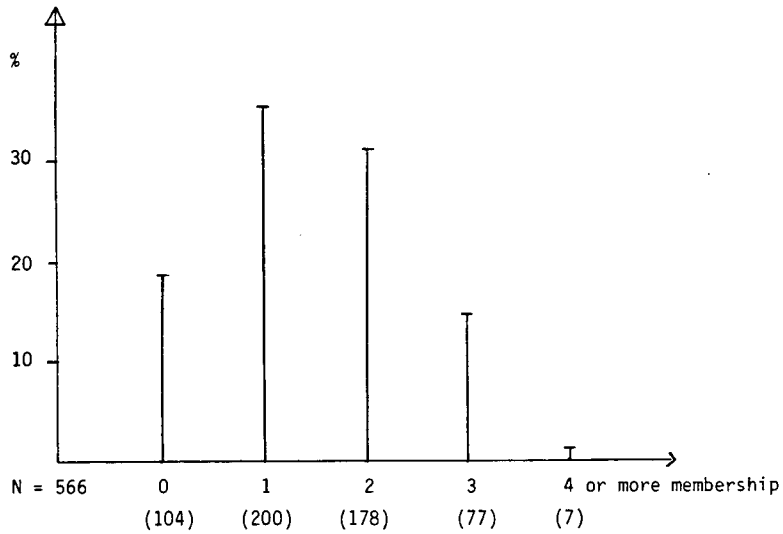
Fig. 3: Students and NS organizations (1933 - 1945) from the RSW Data



(Since membership, especially in SS and NSDAP, and SA and NSDAP, is often overlapping, the sum of the percentages is more than 100.)

Of the 566 students in our sample, only 110 (= 19,4%) were not a member of a NS organization, a large majority was organized in one or more NS formations, especially in the NSDAP, SA and NSDStB.

Fig. 4: Number of NS organizations from the RSW Data

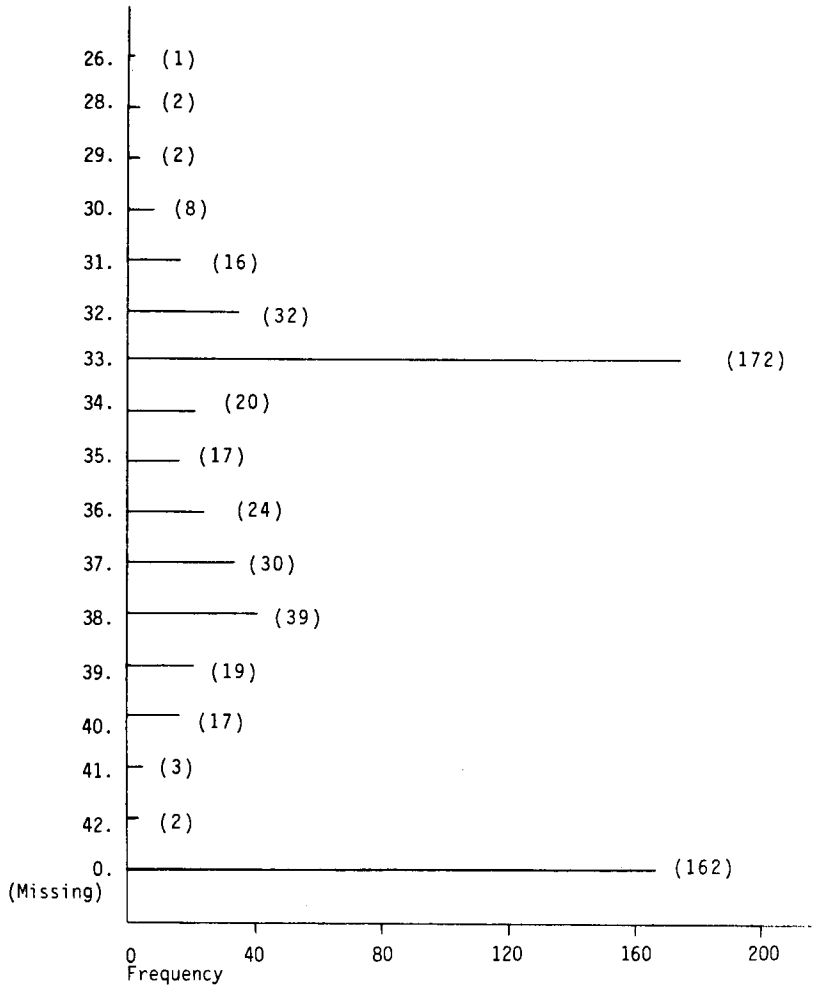


About 27% of the students in the sample (N = 566) were no members or in one of the less important organizations, 73% were members ot either the NSDAP, SS, SA or NSDStB. Altogether we find a very high degree of participation of the students in NS organizations.

Crosstabulating membership in the first and second or third organization shows that members of the SS also had a high probability of being in the NSDAP (75%) and - to a lesser extent - in the NSDStB (34%). Members of the SA were much less represented as well in the NSDAP (41%) as in the NSDStB (27%).

Rather interesting is the distribution of the year when a NS organization was joined.

Fig. 5: Years of first entrance in a NS organization



First membership in a NS organization in 1933 is so high that the students can also be counted as typical examples of the people who fell for Hitler as he came to power.

Altogether we find that - at least when we judge from the available RSW data - the participation of students in NS organizations was very high, a large portion of it certainly caused by opportunistic reasons as seen in Fig. 5.

Our next task is to look for variations in existence and type of NS membership caused by the other sociographic and university-related variables in the sample.

3.2. SEARCHING FOR CAUSAL RELATIONSHIPS

To discover relationships between NS participation and the other variables contained in the RSW data, we checked membership in the first organization, the number of memberships and no membership vs. membership against the following variables by crosstabulation and the usual association measures and significance test.

(The variables were selected by considaration of the variables in the literature and by plausibility. Of course, they are restricted to the variables in the data set.)

- birth cohorts
- sex
- father still alive
- size of father's hometown
- father living in Germany or not
- father's social status
- student living at home
- student's field of study agrees with father's profession
- type of university
- regional location of university
- size of university town
- size of university
- subject of study
- period of the first loan
- amount of the total loan

Of all these variables, only birth cohort, sex, father's status, father's home country, subject of study and time period of the first loan had a significant influence on the participation in NS organizations. Surprisingly, there were no differences between small and big universities, small towns and big towns and the reginal locations of the universities in the sample. Neither did we find differences between students whose fathers were alive or those whose fathers had died nor between students who lived at home and those who did not.

Before using more sophisticated methods to analyze the influence of the independent variables on NS participation, we take a look at the two-dimensional tables.

Table 7: Sex by first membership (RSW data 1933 - 1942)

	NSDAP	SS	SA	NSDStB	OTHERS	NO MEMBER	Σ
MALE	74 14.5	64 12.5	195 38.1	50 9.8	37 7.2	92 18.0	512 91.9
FEMALE	5 11.1	0 0.0	0 0.0	18 40.0	11 24.4	11 24.4	45 8.1
Σ	79 14.2	64 11.5	195 35.0	68 12.2	48 8.6	103 18.5	557 100

$\chi^2 = 27,13$ 5 df significant at $\alpha = 0,01$

Cramer's V = .3237

There are, of course, no female students in the SS or SA; this explains the large deviation between male and female students. On the other hand, there is no great discrepancy in the category no membership, so there appears to be no great difference between male and female student participation after 1933.

Table 8: Period of first loan by first membership (RSW data 1933 - 1945)

	NSDAP	SS	SA	NSDStB	OTHERS	NO MEMBER	Σ
1933 - 1938	31 9.1	32 9.4	151 44.2	26 7.6	29 8.5	73 21.3	342 61.0
1939 - 1942	48 21.9	32 14.6	45 20.5	42 19.2	20 9.1	32 14.9	219 39.0
Σ	79 14.1	64 11.4	196 34.9	68 12.1	49 8.7	105 18.7	561

$\chi^2 = 58,24$ 5 df significant at $\alpha = 0,01$

Cramer's V = 0,322

While in the first period from 1933 - 1938 the SA was by far the most dominant organization, there is a shift from the SA to the NSDAP and the SS for the students of the second period. Since many students joined a NS organization one or two years before receiving the first loan, the change took place on the average probably two years before the periods we used; this change is reflected in table 8. We also find that the number in the category no member drops from 21,3% in the first period to 14,9% in the second.

Table 9: Father's home country by first membership (RSW data 1933 - 1945)

	NSDAP	SS	SA	NSDStB	OTHERS	NO MEMBER	Σ
Father in Germany	66 15.3	45 10.4	163 37.8	52 12.1	36 8.4	69 16.0	431 80.9
Father not in Germany	10 9.8	18 17.6	25 24.5	12 11.8	11 10.8	26 25.5	102 19.1
Σ	76 14.3	63 11.8	188 35.3	64 12.0	47 8.8	95 17.8	533

$\chi^2 = 14,24$ 5 df significant at $\alpha = 0,05$

Cramer's V = 0,109

In coding father's home country we took the German boundaries of 1937, so that the Austrians, constituting about half of the students whose father did not live in Germany, are not counted as Germans in spite of the Anschluß in 1938. The interesting difference is the higher proportion of "foreign" students in the SS and the lower proportion in the SA. In my opinion, this is caused by the Austrians agian, studying in Germany mainly after 1934, when the attractiveness of the SA was already declining.

The next table shows clearly the dependence of participation in a NS organization on the birth cohort a student belonged to.

Table 10: Birth cohort by first membership (RSW data)

	NSDAP	SS	SA	NSDStB	OTHERS	NO MEMBER	Σ
till 1899	2 25.0	0 0	0 0	0 0	0 0	6 75.0	8 1.4
1900 - 1904	1 3.6	6 21.4	5 17.9	1 3.6	3 10.7	12 42.9	28 5.0
1905 - 1909	13 11.7	6 5.4	45 40.5	7 6.3	7 6.3	33 29.7	111 19.9
1910 - 1914	35 11.7	44 14.7	125 41.8	33 11.0	26 8.7	36 12.0	299 53.6
1915 - 1925	28 25.0	8 7.1	21 18.8	26 23.2	13 11.6	16 14.3	112 20.1
Σ	79 14.2	64 11.5	196 35.1	67 12.0	49 8.8	103 18.5	558 100.0

$\chi^2 = 102,30$ 20 DF $\alpha = 0,01$

Cramer's V = .2140

The probability of not being a member ot a NS organization increases with the age of the student. Students from the birth cohort 1905 - 1909 had a very high tendency to join the SA, while the cohort 1910 - 1914 still joined the SA but also moved into SS, NSDStB and others. The last cohort shows a higher probability of choosing the NSDAP or NSDStB as first organization. The attractivity of the SA for this group is - compared to the other groups - relatively small. Probably most students of this birth cohort joined a NS organization after 1934 when the SA was not that important anymore.

We can only guess what made the SS less attractive to this birth cohort; maybe the growing knowledge of the true nature of this formation deterred students from joining it from a certain period of time on.

Table 11 shows how father's status affected the probability of being a member of a NS organization and ot choosing a certain organization.

Table 11: Father's status by first membership (RSW data, female students excluded)

	NSDAP	SS	SA	NSDStB	OTHERS	NO MEMBER	Σ
Nobility and propertied classes	2 7.4	5 18.5	11 40.7	2 7.4	3 11.1	4 14.8	27 5.4
Officials with college education	5 8.6	11 19.0	18 31.0	0 0	6 10.3	18 31.0	58 11.6
Professionals with college education	7 13.7	6 11.8	19 37.3	10 19.6	3 5.9	6 11.8	51 10.2
Old middle class	14 10.8	14 10.8	51 39.2	11 8.5	8 6.2	32 24.6	130 26.1
New middle class	35 18.6	22 11.7	75 39.9	19 10.1	15 8.0	22 1.7	188 37.8
working class	9 20.5	4 9.1	17 38.6	5 11.4	2 4.5	7 15.9	44 8.8
Σ	72 14.5	62 12.4	191 38.4	47 9.4	37 7.4	89 17.9	498 100.0

χ^2 = 39,44 DF 25 = 0,05
Cramer's V = .1259

In the last column we find that students whose fathers were officials with a college education (31%) and students from the old middle class (24,6%) have the highest tendency not to become a member, while students whose fathers are university-educated professionals (11,8%) or come from the new middle class (11,7%) are rather pone to join a NS organization. Students from the propertied classes and working class students keep in the middle.

Except for the children of university-educated officials, the tendency to join the SA (about 39%) is the same for all groups; the same result holds true for the SS, only we have a higher percentage (19%) of students from the officials' class. This result could be interpreted as a higher polarization in this group of students than in the others. The distribution of the students caused by father's status could - in my opinion - be explained by a strong wish for upward social mobility in the case of the middle class student and a fear of downward mobility which was very real for professionals during the economic crisis 1929 - 1932. On the other hand, university-educated officials holding high offices in the national, state and local governments can be thought of as rather conservative elements, in their existence not so much threatened by the economic ups and downs during the Weimar republic as the professionals. The case of the old middle class is most interesting. Judging from the literature (Kreutzberger, 1972, p. 62), I expected that the students from the old middle class were most likely to join a NS organization, but the opposite is true. Since the economic situation was equally bad for the professionals and the old middle class, the great difference in NS membership has to be explained by other variables. Speculatively, I think that the old middle class was political rooted in Christian conservatism while the professionals showed a preference for liberal parties with nationalistic tendencies.

In the following table we analyse the relationship between subject of study and first membership.

Table 12: Subject of study by first membership (RSW data, female students excluded)

	NSDAP	SS	SA	NSDStB	OTHERS	NONE	Σ
Theology	2 10.0	0 0	9 45.0	2 10.0	0 0	7 35.0	20 4.1
Law & Economics	22 20.6	14 13.1	39 36.4	9 8.4	3 2.8	20 18.7	107 21.7
Medicine, Pharmacy	15 10.5	23 16.1	58 40.6	9 6.3	16 11.2	22 15.4	143 29.0
Science	6 12.0	4 8.0	21 42.0	2 4.0	3 6.0	14 28.0	50 10.1
Liberal Arts	7 14.0	8 16.0	18 36.0	5 10.0	4 8.0	8 16.0	50 10.1
Architecture	4 8.0	6 12.0	16 32.0	9 18.0	2 4.0	13 26.0	50 10.1
Engineering	6 14.0	4 9.3	16 37.2	7 16.3	6 14.0	4 9.3	43 8.7
Others	7 23.3	4 13.3	12 40.0	3 10.0	3 10.0	1 3.3	30 6.1
Σ	69 14.0	63 12.8	189 38.3	46 9.3	37 7.5	89 18.1	493 100.0

$\chi^2 = 48,9$ 35 DF $\alpha = 0,05$

Cramer's V = .141

Let us first look at students, who were not members: we find a more than average proportion in theology (35%, mainly catholic theologians), science (28%) and architecture (26%) and a less than average proportion in engineering (9,3%). Law and economics (18,7%), medicine (15,4%) and liberal arts (16%) are centered about the mean value of 18,1%. On the other hand, we find an especially high number of medical (16,1) and liberal arts students (16%) in the SS and also of medical students in the SA (40,6%). Added together, 56,7% of the 143 male edical students in our sample were members of the SS or SA, closely followed by liberal arts students with 52%.

Summarizing the results of this section, we find that most of the variables found in the RSW data, e.g. different types of universities, cannot be used to explain NS membership. The contribution of other variables is either trivial, e.g. sex, since female students were not in the SA or SS, or can be accounted for by other variables. This holds true for the variables time

period of the first loan which is explained by the variable birth cohort. This is suggested by the strong association between birth cohort and time period of the first loan and will also be proved in the next section, so that the result of table 8 can to a great extent be seen as caused by the relation displayed in table 10. Birth cohort and father's status remain as substantial variables; the influence of the subject of study is much less, as we will show in the next section.

3.3. ESTIMATING THE EFFECTS OF INDEPENDENT VARIABLES ON NS MEMBERSHIP

Until now, we have only looked at the bivariate distributions of one independent variable with the dependent variable. Therefore, we were not able to eliminate the effects which the independent variables exert on each other and which, in turn, affect the dependent variable; thus we could not estimate which independent variable is more important than the other. To answer this question and to eliminate the effects of the independent variables on each other, regression analysis or analysis of variance is commonly used. Unfortunately, we cannot use this approach as the dependent variable - membership in a NS organization - is a qualitative (or nominally scaled) variable. Therfore, we have to use a more general statistical method, which incorporates regression analysis and analysis of variance as special cases. It is called GLM (Generalized Linear Models; Nelder and Wedderburn, 1972) and allows to handle qualitative dependent variables in an analysis of (co)variance type of statistical analysis. We illustrate this approach with the following simple model.

As dependent variable we use the dichotomy: "no member of a NS organization vs. member of a NS organization" (variable A). We restrict the analysis to male students and use as independent variables birth cohort (variable B) - trichotomized in born before 1910 (B_1), between 1910 - 1914 (B_2) and after 1914 (B_3) - father's status (variable C), categorized as before (C_1 - C_6), and period of the first loan (variable D) with the categories 1933 - 1938 (D_1) and 1939 to 1942. We start with the fourdimensional contingency table of all variables. For every combination (ijk) of the three independent variables we compute the ratio

w_{ijk} = member of non members/number of members and its logarithm

y_{ijk} = an w_{ijk} (6),

y_{ijk} is then treated as a metric varible and an analysis of variance is performed.

$$y_{ijk} = GM + B_i + C_j + D_k + BC_{ij} + CD_{jk} + BCD_{ijk}$$

with $\sum_i B_i = \sum_j C_j = \sum_k D_k = 0$ and all sums of interaction terms also = 0.

Analogous to analysis of variance, GM is the general mean, B_i, C_j, D_k are main effects measuring the deviation from the average, and BC_{ij}, D_{ik}, CD_{jk} are interaction terms of first, BCD_{ijk} of second order.

We are now able to set up different models by equating certain parameters to 0. For instance, if we set BCD_{ijk} = 0 for all combinations (ijk) we surmise that the logodds y_{ijk} are caused by the two-dimensional variables BC, BD and CD. If we equate BC_{ij}, BD_{ik}, CD_{jk} to 0 for all i, j, k, we suppose that B, C and D explain the logodds independently from each other.

Each hypothesis can be tested by a likelihood ratio test similar to the usual χ^2 test.

In our example, we start with the model

I $y_{ijk} = GM + B_i + C_j + D_k$

and then compute the models

II $y_{ijk} = GM + B_i + C_j$ to estimate the effect caused by D
III $y_{ijk} = GM + B_i + D_k$ to estimate the effect caused by C
IV $y_{ijk} = GM + C_j + D_k$ to estimate the effect caused by B

Table 13: Logit models for NS membership

	I	II	III	IV
Model	GM+B+C+D	GM+B+C (without D)	GM+B+D (without C)	GM+C+D (without B)
Goodness of fit measured in χ^2	15,66	15,83	27,06	36,66
Degrees of freedom	26 model fits well	27	31	28
Differences in the goodness of fit to model I	-	0,17	11,4	21
Differences in the degrees of freedom to model I	-	1	5	2
variable significant at α =	-	,70	0,05	0,0
Size of effect of variable PRE+	-	0,011	0,421	0,573

The significance level (7) shows at once, that only birth cohort and father's status have significant effects on NS membership. Time period is not important at all if we account at the same time for birth cohort, as we do in model II. The size of effect PRE is estimated as an analogue on to the PRE^2 (proportional reduction of error) coefficient of regression statistics (8). Since Model II fits very well (χ^2= 15,83, DF = 27), we use it to estimate parameters GM, B_i, C_j with the following results:

GM = -1,5239

B_1 = +0,7486
B_2 = -0,5724
B_3 = -0,1763

C_1 = +0,1222
C_2 = +0,4181
C_3 = -0,2785
C_4 = +0,3864
C_5 = -0,5644
C_6 = -0,0837

The parameters should be interpreted as follows. GM is the average logodd of the whole sample. If B_i or C_j is greater than 0, the chance not to be a NS member is increased; if it is less than 0, this chance is decreased.

The parameters can also be used to compute the probability of not being a NS member in each combination ($\hat{p}_{ij}$) by using the formula

$$\hat{p}_{ij} = e^{\hat{y}_{ij}}/(1 + e^{\hat{y}_{ij}}),\ \hat{y}_{ij} = GM + B_i + C_j$$

under the assumption, that modell II is correct. We find for instance

$$y_{11} = GM + B_1 + C_1 = -1,5239 + 0,7486 + 0,1222 = -0,6531 \Rightarrow p_{11} = 34,2\%$$

for the combination first birth cohort and father belongs to the propertied classes or

$$y_{25} = GM + B_2 + C_5 = -0,6531 - 1,321 - 0,6866 = -2,6607 \Rightarrow p_{25} = 6,5\%$$

for the combination second birth cohort and father is a member of the new middle class.

The parameters are now interpreted quite directly:

In comparison to the mean of the student sample the first birth cohort (B_1 = + 0,7486) has a much higher probability of not becoming a member of a NS organization, the second birth cohort has a much lower (CB_2 = - 0,5724), while the third one has a probability near the sample mean (B_2 = - 0,1763). Father's status influences the probability in the following way.[3] Compared to the average student, coming from the class of university-educated officials

increases the probability of not becoming a NS member most (C_2 = + 0,4181), followed by coming from the old middle class (C_4 = + 0,2644) and the propertied classes (+ 0,1222). Students from the working class are close to the average (C_6 = - 0,0837), students, whose fathers are university educated professionals (C_3 = - 0,2785) or members of the new middle class (- 0,5644) are most likely to join a NS formation.

With the help of the parameters, we can identify typical not-NS members, for instance students from the first birth cohort and the old middle or higher bureaucratic class, and typical NS members such as students from the second birth cohort and from the class of university-educated professionals or the new middle class.

Generalized linear models can also be used for the analysis of polytomous dependent variables in the framework of loglinear analysis of contingency tables. We used, as dependent variable, first membership in a NS organization (Cf Section 3.2) and added, as independent variable, main subject of study instead of period of the first loan. Performing the same analysis as before by checking different models, we had to eliminate subject of study. In spite of having an effect in the two-dimensional analysis, this variable proved to be unimportant in the more sophisticated GLM analysis. This is caused agein by the birth cohorts, which show significantly different preferences for subjects of study. As already mentioned, father's status has no significant influence on subject of study, at least not in the RSW data.

Altogether, only birth cohort and father's status emerge as important independent variables - at least from this set of data - while subject of study and first period of loan lose their importance as soon as the effect of birth cohort on these variables is accounted for.

We have to remember that all of our results are based on the RSW data, which, as we have shown before, do not constitute a random sample from the students of this period. If we want to draw inferences from the RSW data, we have to take the bias contained in these data into consideration.

A good method to do this was discovered by statisticians already 40 years ago and is called iterative proportional fitting. It adjusts a contingency table in k dimensions to marginal distributions of the dimension $1 < k$, which could come from another census or other data sources. We illustrate this very useful method with the following simple example: From the census data we take the distribution of father's status, from the RSW sample the conditional distribution of NS membership given father's status in percent. If we multiply these percentages with the absolute frequencies of the census data, we adjust the twodimensional distribution from the sample to the marginal distribution of the census data and thus get a better estimate of the total number of students participating in NS organisations.

Table 14: Frequencies for NS membership adjusted for marginal distribution of father's status from census data. (Female students excluded)

	Sample			census data scaled for 1000 students		
	No NS member	NS member	Σ	No NS member	NS member	Σ
nobility and propertied classes	5 18.5	22 81.5	27 5.4	21	92	113
officials with college education	15 26.3	42 73.6	57 11.5	37	107	142
professionals with college education	6 11.8	45 88.2	51 10.3	7	52	59
old middle class	31 24.0	98 76.0	129 26.0	54	171	225
new middle class	20 10.6	168 89.4	188 37.9	42	353	395
working class	7 15.9	37 84.1	44 8.9	7	34	41
Σ	84 16.9	412 83.1	496	168 16.8	832 83.1	1000

Source of the census data: Deutsche Hochschulstatistik, Band 14, Winterhalbjahr 1934/35.

We see in this example that the total number of students not in NS organisations remains practically the same. As can easily be seen in the sample data, the main reasons for the bias - the underrepresentation of students whose fathers are college-educated officials and of the new middle class -, are compensated by the overrepresentation of the students from the old middle class and the professionals. If the whole information is comprised in the number of non-members per 1.000 students, the difference between the sample and the census data diminishes. Of course, this adjustment compensates the bias only for one variable - father's status - but it can also be done iteratively for more than one varible. The necessary basis for this is the existence of marginal distributions for the student population, which, for instance in the case of birth cohorts, could not be found yet. It can be shown that the method of iterative proportional fitting is another special case of the generalized linear model.

4. Summary

On the basis of available census data, an attempt was made to check the representativity of the RSW data for the total student population from 1933 to 1942. Differences were found in the variables sex, father's status and subject of study, so the data must be used with great caution in drawing inferences on the total student population. Involvement of students in NS organizations was very high - at least in the RSW sample. Of all the variables from the data set only a few - sex, birth cohort, father's status, time period of first loan and subject of study - proved to be important for explaining NS membership. By using a more sophisticated method, the number of variables could be further reduced to birth cohort and father's status. Finally a method is shown to estimate the NS involvement of the total number of students. This method can however be used for one variable only as no census data for birth cohort are as yet available.

FOOTNOTES

1) Prepared for the Social Science History Association's Annual meeting in Nashville, Tennessee, Oct. 23 - 25 1981.
2) 80% of the loans in the sample were in the range of about 250 to 1250 Reichsmark. For a comparison, the monthly salary of a civil servant in a position that could be expected by a student after his graduation was 358 RM in January 1932, the monthly salary of a junior bank clerk was 128 RM in June 1935. (Source: Stat. Jahrbuch 1935)
3) For each time period the deviation of table 2 from table 1 was checked with a $2\hat{1}$ significance test, which is equivalent to a χ^2 test for goodness of fit using the values of table 1 as expected values. For both periods, the tests are significant at a 1% error probability α.
   $2\hat{1} = 30.08$, df = 5 for the first period
   (df = degrees of freedom)
   $2\hat{1} = 39.62$, df = 5 for the second period
4) The categories of social status are taken from Jarausch (1980). Examples for the categories are found in the appendix.
5) The definitions of the subjects of study can be found in the appendix.
6) If one of the numbers is 0, this 0 is set to 0,5 or 0,1 to avoid computing the logarithm of 0.
7) Computing the significance level rests on the statistical theorem of additivity of χ^2 implying that, if model I fits, the differences of χ^2 in the other models is distributed as a χ^2 variable under the hypothesis H_0: The variable that was left out has no effect. The degrees of freedom are found by computing the difference in degrees of freedom of the models to model I.
8) One computes χ^2 under different models, for instance χ^2_I and χ^2_{II} and uses the formule $PRE^+ = (\chi^2_{II} - \chi^2_I) / \chi^2_{II}$.

APPENDIX

List of variables

Demographic variables
- date of birth
- country of birth
- marital status*

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* Variables marked with a * had so many missing values that analysis does not make sense.

- survival of world war II*
- existence of father
- social status of father
- country of father's residence

"University" variables
- university
- type of university
- size of university
- region of university
- town of university
- size of town
- faculty
- main subject of study
- type of diploma*

Father's social status
The categories for the variable social status of father were taken from K. H. Jaruasch (1980).

Nobility and well to do:
aristocracy, landed proprietors, men of private means, industrialists, bankers, top managers etc.

Officials with college education
Civil servants in high positions of local, state and national governments, judges, priests, professors, military officers etc.

Professionals with college education
doctors, lawyers, pharmacists, engineers, journalists, artists etc.

Old middle class
farmers, artisans, traders, non-commissioned officers, shop-keepers etc.

New middle class
officials on low positions, teachers in grammar schools, clerks, skilled workers etc.

Lower class
Workers, servants, unemployed etc.

Loan variables
- year of the first loan
- period of the first loan
- amount of loan

Organization variables
- military service*
- service in the Freiwilliger Arbeitsdienst or Reichsarbeitsdienst+
- Type of NS organization
- number of NS organization

Subjects of study

Theology:
- Catholic theology
- Lutheran theology

Law and Economics:
- law
- political science
- social science
- economics

Medicine:
- medicine
- dental surgery
- pharmacy

Sciences:
- biology
- chemistry
- geology
- physics
- mathematics

Liberals Arts:
- classical languages
- modern languages
- German literature
- philosophy
- psychology and education
- history
- geography
- journalism

Art and music

Architecture:
- architecture
- construction

Engineering:
- mechanical engineering
- electrical engineering

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