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RELIGIOUS ASSORTATIVE MARRIAGE IN THE NETHERLANDS, 1938-1983

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The Netherlands

In this paper, we test for a trend toward secularization in Dutch society between 1938 and 1983, using religious assortative marriage as an indicator. We use loglinear modelling techniques similar to those used in mobility analysis to control for the sizes of the denominations. In addition, spatial dispersion is controlled by repeating the analysis for provinces in the years 1938, 1963 and 1983. Blau's macro-sociological theory of intergroup relations is used to provide a theoretical foundation for the research techniques used. This is supplemented by a specification of the mechanisms through which macro-sociological factors such as industrialization can influence individual decisions, resulting in religious assortative marriage. Inmarriage for members of the orthodox protestant Re-Reformed church and for Catholics followed a similar trend: more or less constant until the end of the 1950s, a sharp drop during the 1960s, and a more gradual decline after 1973. However, inmarriage among members of the liberal protestant Dutch Reformed Church fluctuated slightly with no apparent trend. This provides qualified support for the proposition that religion has become less salient in Dutch society during the 1960s and 1970s. The analysis per province shows that in 1938 and 1963, despite a substantial loss of information, the patterns found at the aggregated level were replicated at provincial level. Inmarriage rates tended to be lower in provinces with a relatively high degree of urbanization/industrialization.

BACKGROUND AND RESEARCH QUESTIONS

The study of long-term trends is an important subject for sociologists, and various theories of technological and ideological change (Nisbet, 1966; Lenski, Lenski and Nolan, 1991) provide numerous testable predictions. Among these are the disappearance of fixed class (Kerr, 1960; Kerr, 1983) and the downfall of the sacred (Weber, 1921; Wilson, 1967). In this paper, we test for a trend toward secularity for the Netherlands during the 20th century, using religiously mixed marriages as an indicator.

Of the trends predicted by these theories, that from social stability to social mobility received most attention in quantitative research. Mobility research started out as the determination of percentages of mobile persons within some population. It soon was found that *gross* mobility logically depends upon the size of occupational categories. Mobility research then moved on to study an aspect of a population's mobility pattern that is not dependent on this matter. This facet is the unequal outcome of a competition between persons from different origins for one destination rather than another (Goldthorpe, 1980: 77). It was dubbed *relative* mobility.

To answer questions about trends in relative social mobility, recent studies

applied special loglinear techniques (Hout, 1983, gives an overview). These techniques have also been applied to outmarriage between occupational and educational categories, another indicator for the disappearance of fixed class. Findings on absolute and relative educational heterogamy in 23 industrial countries show that social mixing from the 1950s on became more widespread in one of the most intimate bonds between persons (Ultee and Luijkx, 1990).

Given the importance people attach to making a match, the pivotal place of marriage in traditional notions of the sacred, and institutional obstacles against rites celebrating religiously mixed marriages, an increase in religious outmarriage indicates a more peripheral place of religion in social life (Glenn, 1982; McCutcheon, 1988). Thus the downfall of the sacred can be studied through the indicator of religiously mixed marriages, in a manner similar to which social mobility and educational heterogamy inform on the disappearance of fixed class. In fact, early studies supplemented questions on what is now termed gross religious outmarriage with those on relative religious outmarriage (Heer, 1962). Until now, loglinear techniques have only been applied to the analysis of religious assortative marriage at one single moment (Johnson, 1980).

Focusing on gross religious outmarriage, Heer (1962) found a trend toward less religious inmarriage for Canada between 1922 and 1957, Mol (1973) for Australia between 1891 and 1961, and Glenn (1982) for the United States between 1957 and 1973-1978. However, for the Netherlands Dekker (1965) found a decrease in gross religious outmarriage between 1947 and 1960. Interestingly, for the Netherlands it also has been found that the shift away from fixed class was far reaching. Ganzeboom and De Graaf (1984) showed that between 1954 and 1977 gross and relative father-son mobility increased. By way of cohort analysis, Ganzeboom and De Graaf (1989) established that from 1891 to until 1960 father-child relative educational mobility expanded too. Sixma and Ultee (1984) found an increase in gross and relative educational heterogamy between 1959 and 1977. Given these findings, the Netherlands is an instructive choice for questions on trends in relative outmarriage.

In the following paragraphs we present results on relative religious assortative marriage in the Netherlands between 1938 and 1983. For every fifth year a table is analyzed that cross-classifies the denomination of husband against that of wife, for all marriages contracted in the Netherlands during that year. The national trend established, we proceed to an analysis of relative outmarriage in separate Dutch provinces for three of the years involved. We do so in order to check whether aggregation masks trends in relative religious assortative marriage at a lower level. The presentation of our results is preceded by a sharpening of our prediction, using Blau's theory of intergroup relations, and by a discussion of the loglinear models used in mobility research to be applied to the analysis of religious assortative marriage.

STUDYING RELATIVE RELIGIOUS ASSORTATIVE MARRIAGE

Goode (1982: xvii) stated about industrialization as a cause of changes in the family that this term represents a kind of grab bag containing very different kinds of processes. He suggested that if we wish to assert that industrialization has some specific effect, we must specify the process by which it changes the resources at the

disposal of the individuals. Blau's (1977) macrostructural theory of intergroup relations and its later application to outmarriage (Blau and Schwartz, 1984) is pertinent here. Of its two postulates, one pertains to the salience individuals attach to parameters of social structure, the other to the favorability of the opportunity structures individuals face. Applied to our analysis, the salience of parameters of the social structure pertains to the barriers between denominational groups, which determines the "demand" for partners of a different religion. The opportunity structures pertain to the substantively less interesting matter of "supply" (i.e. the absence or presence) of partners from other denominations.

Barriers Against Religious Outmarriage

According to the social comparison theory, people prefer interaction with persons having the same status and the same opinions as themselves (Festinger, 1954). Incompatibility of beliefs seems to be the main reason for not choosing a marriage partner from a different denomination. If religion is salient, individual preferences for partners with compatible opinions can cause the formation of groups along religious lines, containing norms against religiously mixed marriages, supported by social control. In addition, formal norms such as church laws can be operative. The 1918 Code of Canon Law of the Roman Catholic Church forbids marriages with members of "an heretical or schismatical sect," which included the protestant denominations. These regulations were relaxed as of 1966 (Besanceney, 1970:115-123). The (orthodox protestant) Re-Reformed churches had a similar stand in the Netherlands. The (liberal protestant) Dutch Reformed church discouraged mixed marriages on the grounds that doctrinal differences thwart marital happiness (Dekker, 1965:116-124).

Finally, beside church laws, civil laws can prevail that strengthen religious inmarriage. In the Netherlands until 1970 the civil code stipulated parental approval for persons marrying under 30 years. If permission was withheld, the period between the proclamation of the bans and the actual registration of the marriage was lengthened.

Religious Outmarriage and the "Supply" of Marriage Partners

Individual preferences for a partner with similar beliefs, together with denominational group norms, form barriers that determine the "demand" for a marriage partner with a different denomination. Blau's theory of intergroup relations examines a set of "supply" factors that also affect the gross rate of outmarriage and that must be taken into account to determine the relative rate of outmarriage, which indicates the strength of the barriers between denominational groups.

One important supply factor stipulated by Blau (1977) is size. Members of a large denomination will have less trouble finding another member of their own denomination than will members of a small denomination. Another supply factor (Blau and Schwartz, 1984) is spatial dispersion. If denominations are concentrated in different parts of a country, then inmarriage could appear to be high, even if religious denomination is not salient. These two supply factors must be taken into account when analyzing religious assortative marriage.

Predicting a Rise in Relative Religious Outmarriage for the Netherlands

On the basis of these considerations concerning demand and supply of marriage partners, earlier predictions can be qualified. To the extent that industrialism and democracy weaken the salience of religious denomination and enhance opportunities for contact between different denominations, to that extent will industrialism and democracy be accompanied by a trend toward more religious outmarriage. If democracy and industrialism only increase the supply of persons from another denomination, gross percentages of outmarriage go up, but not relative outmarriage. If industrialism and democracy weaken barriers between denominations, loglinear models will indicate more relative outmarriage.

Given the results already obtained on gross religious outmarriage, the question arises on which specif'c grounds a trend toward more relative religious outmarriage can be predicted for the Netherlands. Several concomitants of industrialism seem to make for more gross religious outmarriage only. For instance, industrialism leads to spatial mobility and, in the Netherlands, with its traditional concentration of specific denominations in certain provinces, this makes for more strongly religiously mixed areas. However, at the individual level for those of the old majority religion, this change implies an increased supply of persons with a different denomination. In addition, if industrialism is accompanied by an increase in the percentage of the population stating no religious denomination, the supply of persons with a different faith increases for those with a specific denomination.

On the other hand, there are reasons why industrialization could have brought about an increase in relative religious outmarriage in the Netherlands. Industrialization requires coordinated actions of large heterogeneous groups, enhancing skills for dealing with differences. These skills can carry over into other areas of life. Furthermore, industrialization can limit choices based on "older" criteria. Since inheritance of the family business becomes less important for achievement, parental power to sanction partner choice diminishes.

Changes in the nature of states, although not the introduction of general suffrage or the accountability of a government to a parliament (democratization), can make for more relative religious outmarriage too. The separation of church and state led to civil marriage and lowered the barriers the churches themselves had erected against religious outmarriage. The French revolution brought religious freedom to the Netherlands and after several retreats in the 1960s all churches were blessing religiously mixed marriages. It should be emphasized, however, that from World War I up until the present day every Dutch government funded schools run by the various religious denominations to the same extent as public schools. Despite well-known changes in the Catholic church, and the disappearance of many organizations with a denominational character, a strong Christian political party remains, and there are still many separate protestant and Catholic schools. This observation implies that any trend toward more relative religious outmarriage in the Netherlands may be quite weak.

In future research, we hope to test the explanatory power of some of these factors related to technological and ideological changes. At this point, we will use loglinear models such as used in mobility research to examine relative in- and outmarriage in the Netherlands between 1938 and 1983. Conclusions will be checked by an analysis per province.

LOGLINEAR MODELS

We noted above that when ascertaining the extent of religious in- and outmarriage, it is important to cancel out the influence of "supply" factors. Almost all research on religious assortative marriage used the percentage of members of each denomination involved in a mixed marriage. This measure has been found to be unsatisfactory because it ignores the number of potential spouses. The number of potential spouses can be used in the calculation of an expected percentage of mixed marriages, based on the size of each denomination and assuming random mating. Heer (1962) and Glenn (1982, 1984) used a statistic based on the difference between the expected percentage of mixed marriages and the actual percentage to quantify the rate of relative mixed marriages. Mobility research faced a similar problem and tried to solve it in a similar fashion, using the ratio of actual percentage mixed marriages to the expected percentage. However, it was found that this measure was unable to take size adequately into account (see Featherman and Hauser, 1978:141-166; Hout, 1983:16-18).

Mobility research found that the size factor could be canceled using loglinear models (Haberman, 1979; Hout, 1983; Goodman, 1984). The model parameters relating to relative assortative marriages foi each combination of denomination groom/denomination bride are based on the ratio of the number of marriages that have taken place for that combination and the number of marriages expected on the basis of the sizes of the denominations which constitute that combination. This approach is flexible and powerful because it can provide statistics for patterns of inmarriage and outmarriage, as well as the incorporation of group variables and tests on differences between groups.

Loglinear models are discussed briefly below, after which the results of models we have tested are presented. For those not interested in these technical details we can say that the best model is one with inmarriage rates that differ per denomination and change over time. Relative outmarriage rates for each year separately can be combined into 6 levels (out of a possible 10). However, because outmarriage rates for some combinations rose in relative frequency while others dropped, the content of these levels varies from year to year, particularly from 1963 onward. These results are discussed in the paragraph "Relative inmarriage and outmarriage between 1938 and 1983."

For a saturated model of a square $R \times R$ frequency table, the observed frequency of cell ij is split up into:

(a) an overall effect,

(b) a contribution due to membership of category i of the row variable,

(c) a contribution due to membership of category j of the column variable,

(d) a surplus contribution due to membership of both category i and category j. These contributions are multiplicative, i.e.

$$F_{ij} = [overall][row_i][col_j][row_i.col_j] = row_i * col_j$$

The overall effect is the geometrical average of the table. The first order effects row_i and col_j indicate how much higher or lower than this geometrical average the cell frequency would be, taking the row and column marginals into account. The second order effect $row_i.col_j$ indicates the presence of association between the row and column variables and indicates how much higher or lower the frequency is than would be expected on the basis of the grand total of the table and the row and column marginals. A "*" rather than a "." in a second (or higher) order parameter

indicates that inclusion of the high order effect implies the inclusion of all lower order effects for the variables concerned.

A difficulty in the use of multiplicative parameters is that the ratio between two parameters must be examined to see how much they differ in strength, but we have a tendency to look at differences (subtraction) instead. For this reason, the logarithm of parameters are sometimes reported. We chose to present parameters in the form of plots, using a logarithmic scale.

It is clear that the information given by parameters of a loglinear model can only be in relative terms: restrictions must be placed on each term to make one parameter per subscript redundant. The most common restriction is the deviation contrast, which lets each parameter indicate deviation from the (geometrical) average of the parameters of that effect, so that the product over the parameters of an effect is equal to 1. Another common restriction is the simple contrast, which lets the parameters of an effect be relative to a specific category by fixing the parameter for that category to 1. Other contrasts are possible to suit the purpose of the analysis (Finn, 1974).

The purpose in a two way loglinear analysis would be to test whether all second order parameters $row_i.col_j$ are significant. If dropping the term does not have an overly detrimental effect on the fit of the model, it is removed; otherwise the term as a whole is included. In the case of mobility and comparable analyses, a subsequent step to the detection of association in the table is to attempt to describe it in a parsimonious model by placing constraints on certain subsets of the second order parameters. This can be done, for example, by fixing parameters to 1, or by constraining parameters to have equal values. The models for mobility tables make use of the fact that these tables are square, which means that the diagonal of the table shows the extent of immobility (in our case inmarriage). Off-diagonal effects are often expressed in relationship to the diagonal cells.

Models with restrictions are not saturated and an L^2 statistic can be calculated based on the expected frequencies found under the restricted model. The L^2 statistic has an asymptotic chi-square distribution with degrees of freedom based on the number of restrictions placed on the model (after the appropriate contrast has been applied). If the data are from an aselect sample of the population, then the probability can be calculated that the model holds in the population. If this probability is large, then the discrepancy between observed and expected frequencies can be ascribed to sampling fluctuations.

A problem in many mobility analyses is that often either a very large sample or the population data are being used. The probability of a model is useless in these situations: the sampling fluctuations are minuscule or (in the latter case) nonexistent. The purpose of the analysis in such situations is not statistical induction, i.e. finding a population model from sample data, but statistical description describing the relationships in as parsimonious a model as possible while keeping loss of information low.

Raftery (1986) suggested the *BIC* coefficient as a method of dealing with this problem. This measure is derived from Bayesian statistics and is based on the ratio of the probabilities that two alternative models are true, given their observed counts. The *BIC* statistic is equal to $-2\log(B)$, where B is the ratio of the two probabilities. If the saturated model is taken as the alternative model, then for large samples the value of *BIC* can be found by:

$BIC = L^2 - df \cdot ln(N)$. *BIC* must be less than 0 for a model to be acceptable. The

BIC coefficient also allows for a quick assessment of the relative fit of two alternative models: the model with lowest *BIC* value is the best model.

Mobility Models

The starting point for the analysis of mobility tables and comparable applications is the independence model. In the case of religious assortative marriage, this model tests whether choice of partner is based on size of the denominations only, i.e. the hypothesis of a random choice of partners. This is a model of overall and first order effects only: F_{ij} = *[overall][groom$_i$][bride$_j$]*. The independence model fits the marginals of the table exactly. The expected frequencies are equal to those used for the calculation of the chi-square statistic of any contingency table: the row sum for category *i* times the column sum for category *j*, divided by the grand total. For the independence model, this expected frequency is equal to the product of the overall effect, the first order effect for the row variable and the first order effect for the column variable.

The expected values under the independence models are the values used to calculate the expected percentage of mixed marriages in applications by Heer (1962) and Glenn (1982, 1984). If the L^2 of the independence model is significant, we conclude that there is an association between the denominations of the marriage partners. This association can be described by fitting the saturated model, which adds all second order parameters *groom$_i$.bride$_j$* to the independence model. The expected frequencies of this model are equal to the observed frequencies and the L^2 is therefore zero. The second order parameters are equal to the observed frequency divided by an expected frequency based on the overall and first order effects. These expected frequencies are not the same as those found under the independence model, however, but are adjusted to take the association between denomination bride/denomination groom into account. Note this important difference between loglinear techniques and earlier methods for correcting the gross percentage of outmarriage by deducting the expected percentage of outmarriage. Loglinear techniques estimate an expected rate under the assumption of a particular pattern of association between the denomination of bride and denomination of groom. Earlier methods based their expected rate on the assumption of random mating, i.e. no association.

The saturated model is not parsimonious and it is usually possible to describe the association in the table using fewer parameters and at the same time to test substantive hypotheses on the patterns of mobility or intermarriage. An adaptation of the independence model is the *quasi-independence model*: F_{ij} = *[overall] [groom$_i$][bride$_j$][diag$_i$]*. This model (applied to a square table with *R* categories) has *R* parameters *diag$_i$*, for the diagonal cells. The restriction has been applied to the second order terms *groom$_i$.bride$_j$* that parameters for off-diagonal cells have equal values. A simple contrast is applied with these off-diagonal cells as contrast category for the *diag$_i$* parameters, so that these indicate how much higher each diagonal cell is compared to off-diagonal cells. Substantively, this model allows for variable rates of inmarriage per denomination by fitting parameters to the diagonal cells of the table. For the off-diagonal cells the independence model applies, which means that there are no preferences for certain combinations of mixed marriage over others.

The quasi-independence model is a rather restricted model, since it fits only R parameters more than the independence model. Several models have been developed in mobility research that have less restrictions than the quasi-independence model (such as the crossings parameter model or scaled models of association) for situations where the quasi-independence model turns out to be overly restrictive. Unfortunately, these models assume ordered categories, but there is no clear way of ordering religious denominations. One model that does not assume ordered categories, the levels model (Featherman and Hauser, 1978), has been widely criticized as indeterminate; different versions with apparently different implications turn out to have the same predicted values (see Hout, 1983:37-51).

We dealt with this problem by using the deviation contrast, so that we could be certain that the meaning of our parameters was appropriate and intentional. We began by fitting a relatively unrestricted model, the *quasi-symmetrical* model. This model only imposes the restriction that the relative frequency of these outmarriages is the same for men and women, i.e. the restriction on the second order parameters $groom_i.bride_j$ that $groom_i \cdot bride_j = groom_j \cdot bride_i$. This symmetrical interaction parameter is indicated by $symint_{ij}$: $F_{ij} = [overall][groom_i][bride_j][symint_{ij}]$.

The quasi-symmetry model is not parsimonious. We created parsimonious submodels by imposing an equality constraint[1] on off-diagonal (outmarriage) parameters with near equal values. The characteristics of the quasi-symmetry model still apply here. The deviation contrast is used so that the product over the parameters for the categories of denomination husband and/or denomination wife equals 1, and the parameters are symmetrical. The result is a levels *restriction*, as opposed to the levels model. We will refer to these effects as $levres_{ij}$. Precisely which parameters have been constrained to equal values will have to be specified for the model in question, since these designs are created on the basis of preliminary results, rather than on a priori considerations.

THE TREND IN RELIGIOUS ASSORTATIVE MARRIAGE BETWEEN 1938 AND 1983

Data

For the analyses below, we used unpublished data of the Dutch bureau of statistics C.B.S. on the religious denomination of bridegroom and bride for marriages. There were six categories of religion: (orthodox protestant) Re-Reformed, (liberal protestant) Dutch Reformed, Jewish, other religion, no religion, and Roman Catholic. After the second World War, the number of marriages involving Jews became increasingly small; e.g. in 1960 they formed .13 % of the marriages in the Dutch population. Given the rather crude categorization used here, this was irrelevantly small. We therefore decided to drop Jews from the analysis. Data prior to 1938 unfortunately neglected to distinguish between the orthodox protestant Re-Reformed denomination, and the liberal protestant Dutch Reformed denomination, but there are strong differences between the two, as will be shown below. Information on the denominations of marriage partners was no longer collected after 1986. For the analysis of the trend in religious assortative marriage, we used the tables for the years 1938, 1943, 1948, 1953, 1958, 1963, 1968, 1973, 1978 and 1983.

The category "other denominations" contained 3.6% of the Dutch population in

1960. This category consisted until approximately 1970 predominantly of small protestant denominations. The largest of these are liberal protestant and comparable to the Dutch Reformed Church. In recent years, this category contains an increasing proportion of non-Christian denominations. In 1971, Islamics, Hindus and Buddhists formed an estimated .44% of the population; this grew to an estimated 2.2% in 1981 (CBS, 1982:25-32).

Figure 1 shows the size of each denomination used in the analyses, as indicated by the number of marriages in that year. Major alterations have taken place in membership of the Dutch Reformed church, whose membership by this criterion has been steadily decreasing, and "no religion," whose size has been steadily increasing. The size of the Catholic group has decreased from a peak in the 1960s, and the category "other denominations" has slightly increased in size from the 1960s on. The size of the Re-Reformed church has remained more or less constant.

"Religious denomination" was self-reported by couples when applying for a marriage license. It has been shown that the phrasing of the question on denomination considerably influences responses (CBS, 1988). Two-phase questions of the type "Do you consider yourself a member of a church or religious group? If so, which one?" measure considerably higher numbers in the "no denomination" category than one-phase questions that simply ask "Which church or religious group are you a member of?"

More significantly, the type of question affects the response more strongly for certain denominations than for others. The last two bars of figure 1 show the estimated size of each denomination in the population in 1983, using single-phase and two-phase questions respectively. The size of the Catholic category is especially affected by the type of question.

Religious denomination in the case of a one-phase question should therefore be interpreted as ingroup identification and, as measured here, it contains both marginal and practicing members. This is actually preferable for our purposes, since it makes the category "no denomination" more homogeneous than it would otherwise be, and because we are primarily interested in ingroup identification rather than the strength of religious beliefs.

Models

To begin we applied 5 standard mobility type models in order to test whether there was association between the denomination of the husband and the denomination of the wife, to determine in general terms the nature of this association, and to test whether the association changed during the period 1938 to 1983. The models were:

1. An independence model. This tests the hypothesis that the patterns of choice of partner in the 10 tables can be explained by random choice of partner.

2. A quasi-independence model that allows inmarriage parameters per denomination, but does not let these vary with time.

3. A quasi-symmetrical model that allows different inmarriage rates per denomination and different outmarriage rates per combination of mixed marriage but imposes the restriction that these parameters are constant across time. This model and model 2 test for the presence of a trend in religious assortative marriage.

4. A quasi-independence model that allows inmarriage parameters to vary per denomination and with time.

Figure 1
The religious composition of the Netherlands, based on the number of persons marrying, between 1938 and 1983
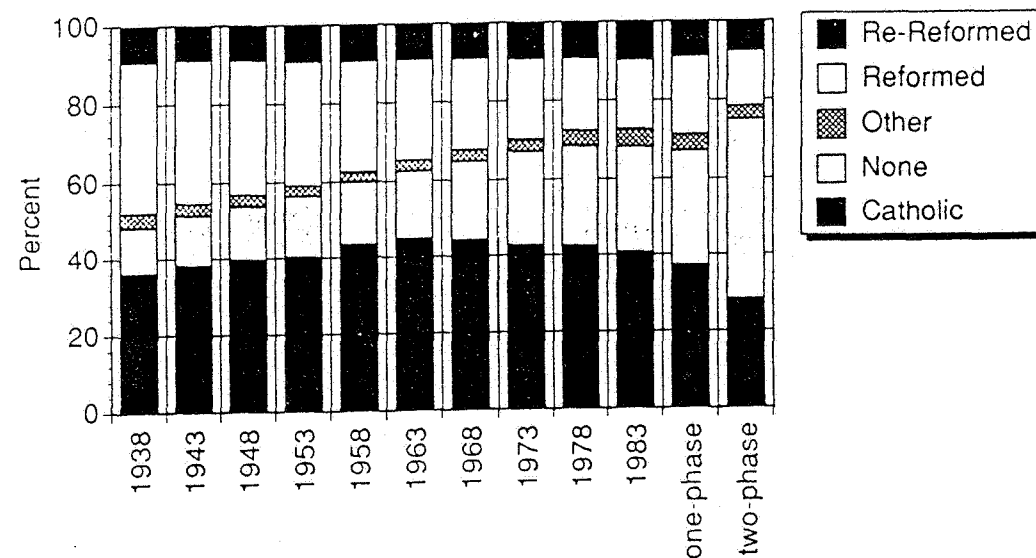
The last two bars pertain to the population values for 1983 as found using one-phase and two-phase questions in questionaires

5. A quasi-symmetrical model that lets inmarriage rates vary per denomination and with time and lets outmarriage rates vary per combination of denominations and with time.

6. A model with 6 levels of outmarriage, based on the results of model 5. This model is discussed more fully below.

All models used the deviation contrast for all parameters, except for the term $diag_i$. For reasons explained in the paragraph on mobility models, a simple contrast was used.

The goodness of fit statistics for these models are presented in Table 1. The very high L^2 and strongly positive BIC value of independence model 1 shows that the association between denomination husband/denomination wife is very strong. The strong drop in L^2 in model 2 for only 5 parameters extra shows that a good deal of this association can be attributed to the propensity to inmarriage. However, model 5 shows that both inmarriage and outmarriage parameters that can vary in time are required to describe the data adequately.

Model 5 has very few restrictions and we therefore attempted to create a more parsimonious submodel by restricting outmarriage parameters to equal values. We had hoped that we would be able to impose a levels restriction that would apply to the entire period 1938-1983. However, an equality constraint on the parameters for the combinations "Reformed:other" and "Reformed:Catholic," which had the closest average values in model 5, increased the L^2 to 807 (70 df) and the BIC to -151. This shows that some outmarriage parameters were rising during this period while others were falling; none had (almost) equal values for most of the period.

Table 1

Goodness of fit statistics for models of religious assortative marriage in the Netherlands between 1938 and 1983

	Model	L^2	df	BIC
1	[main]	924856	160	922665
2	[main][diag_i]	29279	155	27157
3	[main][symint]	18774	150	16690
4	[main][diag_i*time]	11648	110	10142
5	[main][symint*time]	196	60	-625
6	[main][levres*time]	362	100	-1007

main: [overall][groom*time][bride*time]
diag_i: inmarriage parameter per denomination
symint: symmetrical interaction of denomination partner
levres: symmetrical interaction parameters using the deviation contrast, and restricted to 6 levels of outmarriage. The content of these levels depend on the year concerned; see figure 2 for details

Due to this, we had to look at the results of model 5 and create special levels restrictions for each table separately. A 6 levels model was adequate for all tables and for the first 5 years the content of these levels did not change greatly. From 1963 on, crossovers from one level to another are frequent, so that the results,

although a great deal simpler than in model 5, still remain rather complex. The levels restriction model number 6 has an L^2 of 362 with 100 df and a *BIC* value of -1007: a considerable improvement over model 5. The results of this model are discussed in the following paragraph.

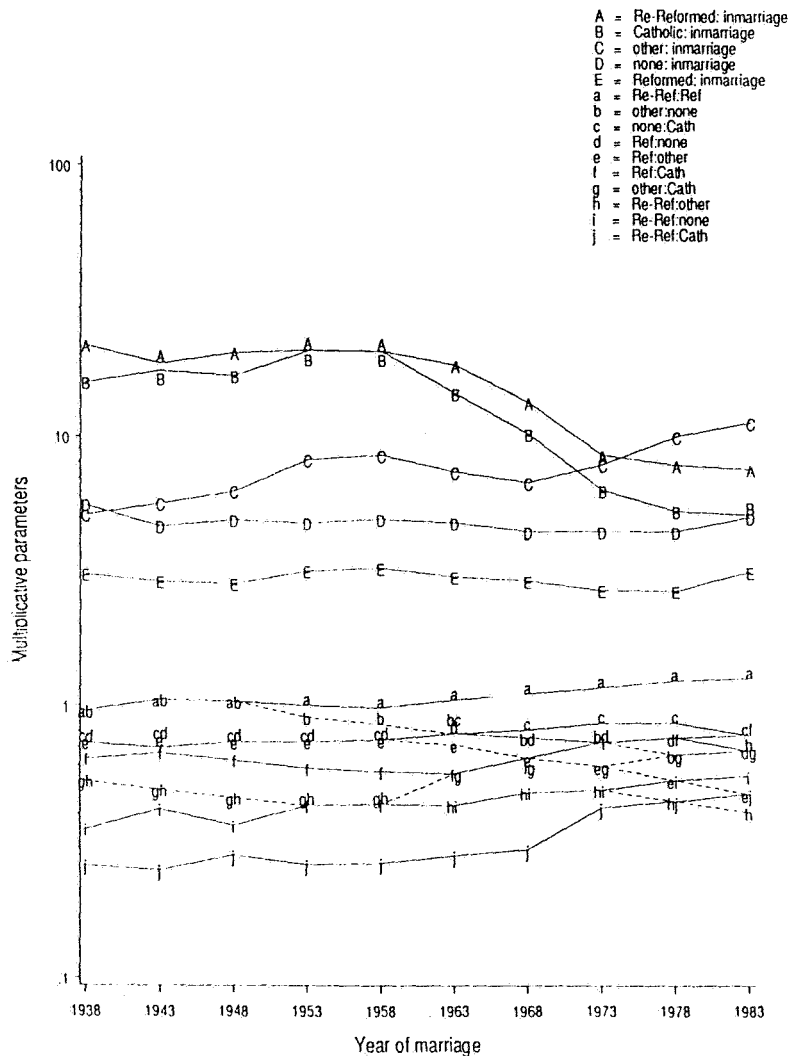*Relative Inmarriage and Outmarriage Between 1938 and 1983*

The results showed that there is a strong association between denomination husband/ denomination wife and that there have been changes in the propensity to both inmarriage and outmarriage between 1938 and 1983. The outmarriage parameters can be restricted to six levels, but the content of the levels shifts, particularly in the second half of the period being examined.

The parameters of model 6 with a six levels restriction on deviation contrast parameters are presented in figure 2. The vertical scale is logarithmic, so that vertical distances correspond with ratios between parameters. Entries in the legend have been sorted according to the (geometrical) average parameter value for all years. Inmarriage parameters have values greater than 1; this means that these combinations occurred more frequently than would be expected by the sizes of the denominations. For example, the value of 22 for members of the Re-Reformed church in 1938 indicates that this combination occurred 22 times more than would be expected, given the size of the denominations in 1938. Outmarriage rates are in most cases less than 1. These values indicate how much less frequently these combinations occurred than expected on the basis of the main effects. For each year, there are 6 "levels" of outmarriage. In figure 2, the letters for outmarriage combinations that have been restricted to equal values are clustered around the point corresponding with the parameter. Note that although the inmarriage parameters for Catholics and Re-Reformed protestants have equal values in 1953 and 1958, this is coincidental and not part of our design. Lines for outmarriage parameters involving persons with "other denomination" have been printed with dotted lines, since the greatest changes tended to involve these combinations.

Inmarriage rates were initially very high for members of the Re-Reformed church and for Roman Catholics. Inmarriage rates were low for members of the Dutch Reformed church, while inmarriage for people with no denomination or other denomination were intermediate.

Relative inmarriage for the Re-Reformed church and for Catholics followed the same trend in figure 2: more or less constant until the end of the 1950s, a sharp drop during the 1960s, and a more gradual decline after 1973. Note that the decrease in inmarriage rates for Catholics had already started when the church liberalized its stand on mixed marriages in 1966. Inmarriage among members of the Dutch Reformed Church fluctuated slightly with no apparent trend. The same goes for the category "no denomination," although there is a net increase in inmarriage for this group. Inmarriage among members of "other denominations" increased somewhat until 1953, maintained that level or dropped slightly up to 1968, and then started to rise sharply. This sudden increase is assumably due to the increasing proportion of non-Christian denominations in the category "other denominations." Inmarriage among members of "other denominations" was strongest in 1983 and approached the high levels of Catholics and Re-Reformed in the '40s and '50s.

Figure 2
Religious assortative marriage in the Netherlands,
1938-1983
Parameters of a quasi-symmetry model
using the deviation contrast
and restricted to six levels of outmarriage

A = Re-Reformed: inmarriage
B = Catholic: inmarriage
C = other: inmarriage
D = none: inmarriage
E = Reformed: inmarriage
a = Re-Ref:Ref
b = other:none
c = none:Cath
d = Ref:none
e = Ref:other
f = Ref:Cath
g = other:Cath
h = Re-Ref:other
i = Re-Ref:none
j = Re-Ref:Cath

As for outmarriage, the legend of figure 2 shows that, with the exception of the combination "Re-Reformed:Reformed," which was the most frequent type of outmarriage, mixed marriages with members of the Re-Reformed church were least frequent. Mixed marriages with persons of no denomination tended to be frequent (with the exception of the combination "none:Re-Reformed"), and mixed

combinations with members of the liberal Dutch Reformed church formed a middle area of frequency. The mixed combinations involving Catholics and "other denominations" did not tend to cluster together.

A mixed marriage with a Catholic was (on the average) the least popular form of outmarriage for both Re-Reformed and Dutch Reformed protestants. These combinations rose in popularity however, particularly the combination "Re-Reformed:Catholic," which had by far the greatest net increase between 1938 and 1983. Mixed combinations involving "other denominations" showed the most changes across time. The combination "other:Catholic" became less frequent from 1938 to 1963, but after that date it began to increase, to a slight net increase in 1983. The remaining combinations involving "other denominations" decreased in popularity (the largest net changes for outmarriage parameters between 1938 and 1983) and were most frequently involved in switches of level. These changes are largely due to shifts in the content of this category. The frequency of combinations involving the category "no denomination" tended to be the most stable. The combination "other:none" dropped considerably in frequency between 1938 and 1983, but the remaining combinations tended to be fairly stable.
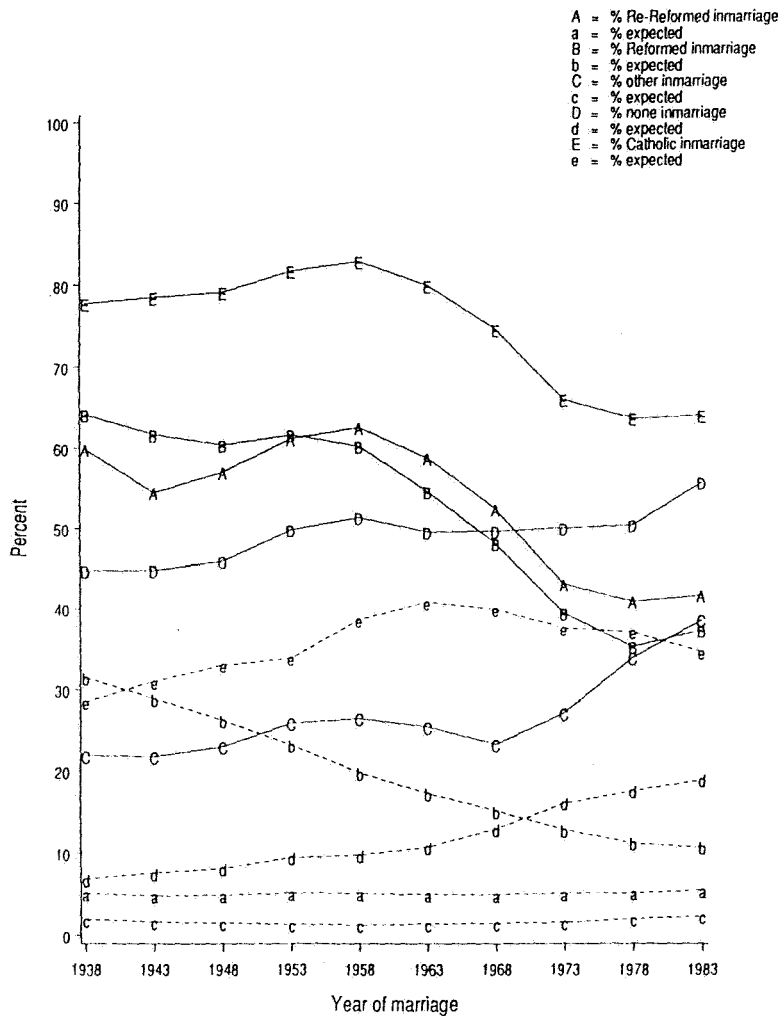
It is interesting to compare the loglinear parameters with the percentage of inmarrying persons. Figure 3 shows the actual percentage and the expected percentage, based on random mating, of inmarrying persons per denomination between 1938 and 1983. Inmarriage for Catholics appears to be a good deal higher than for other denominations, but closer inspection shows that this is because the expected percentage of inmarriages, based on size, is also higher for Catholics. It also appears as though inmarriage rates are the same for members of the Re-Reformed and Dutch Reformed churches, but the expected percentage of inmarriage is about 5% for the small Re-Reformed denomination and falls from 32% in 1938 to 11% in 1983 for the Reformed church. This illustrates how the use of percentages can result in misleading conclusions.

RELIGIOUS ASSORTATIVE MARRIAGE PER PROVINCE

In the preceding analysis, the supply factor size has been effectively canceled out, but the factor spatial dispersion has been ignored. However, the denominations are not evenly distributed in the Netherlands. We can use "province" as a group variable in the loglinear analysis to test whether patterns of religious assortative marriage vary strongly per province. We chose the years 1938, 1963 and 1983 to test whether this is the case. It turned out that there are differences between provinces in assortative marriage patterns in 1938, that the differences were smaller in 1963, and that differences had disappeared in 1983. Although there were differences between provinces, the same pattern found at the aggregated level also applied; mixed marriage combinations that occurred with the same relative frequency for the Netherlands as a whole could also be fixed to equal values in an analysis per province. These results are presented in the next paragraph, following a discussion of the models tested.

Figure 4 shows the religious composition of the Dutch provinces in the years 1938, 1963 and 1983. There are strong differences in composition: the Catholics form a strong majority in the southern provinces Noordbrabant and Limburg; the northern provinces Friesland, Groningen, Drenthe have a protestant majority and a

Figure 3
Percentage inmarrying persons and
expected percentage inmarrying persons
per denomination, 1938-1983

A = % Re-Reformed inmarriage
a = % expected
B = % Reformed inmarriage
b = % expected
C = % other inmarriage
c = % expected
D = % none inmarriage
d = % expected
E = % Catholic inmarriage
e = % expected

Catholic minority, and the other provinces are a mix.

We fitted an independence model as a baseline for comparison, several quasi-symmetry models and the quasi-symmetry model using the levels restriction, for a total of 7 models. Models that did not impose restrictions on the interaction between assortative marriage patterns and time can be broken down into conditional models for each year. We found that it was instructive to do so, since this

Figure 4
The religious composition of the Dutch provinces
Based on the number of persons marrying in 1938, 1963 and 1983

Re-Reformed
Reformed
other
none
Catholic

Friesland
6164
7702
6538

Groningen
6482
7698
5564

Drenthe
8618
4874
5016

Noordholland
25856
33020
22794

Overijssel
8100
13876
11606

Flevoland
932

Utrecht
7042
11212
10412

Gelderland
13402
20866
18966

Zuidholland
35272
44042
33064

Noordbrabant
13536
27908
24250

Zeeland
3890
4168
4044

Limburg
8456
15446
13256
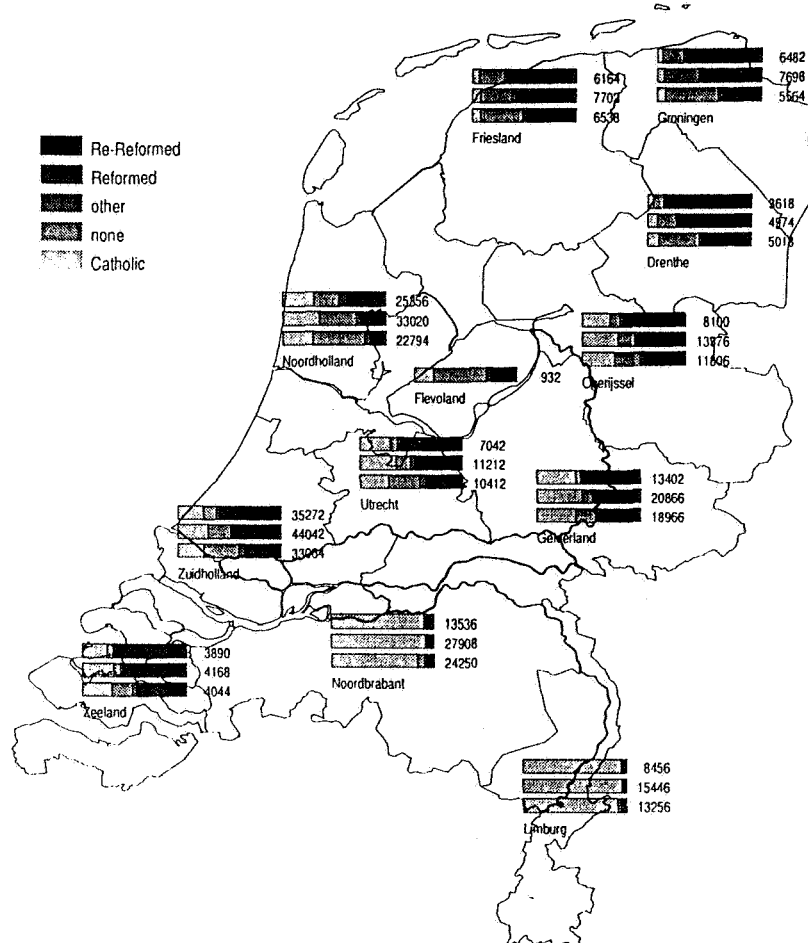
Years are arranged from top to bottom
Total number of marrying persons are shown after each bar

brings to light trends in the differences of assortative marriage patterns between the provinces. The models we tested were:

1. An independence model that takes into account the sizes of the denominations in each year and each province. We broke this down into models of conditional independence for each year.

2. A quasi-symmetry model with inmarriage parameters for each denomination and outmarriage parameters for each combination. These parameters are identical for all provinces and for each year.

3. A quasi-symmetry model with parameters that vary for each province but are constant for all years.

4. A quasi-symmetry model with parameters that vary for each year but are constant for the provinces. This is a key model; its goodness of fit test is a reasonable indication of whether or not there are substantial differences between provinces. This model was also broken down into conditional quasi-symmetry models for each year.

5. A quasi-symmetry model with parameters that vary for each year and for each province. The differences between provinces are restricted to be constant for each of the years (and differences between years are constant for all provinces).

6. A quasi-symmetry model with inmarriage parameters that vary for each year and for each province with no further restrictions. This model is broken down into conditional models for each year.

7. A quasi-symmetry model with a levels restriction on deviation contrast parameters. The form of the levels restriction is conditional on year, so no restrictions were possible on the time factor.

The goodness of fit statistics for these models are given in table 2. The high L^2 and strongly positive *BIC* value for model 1 shows that there is a strong association between the denominations of marriage partners. A symmetrical interaction effect term in model 2 can strongly reduce the L^2, even if it is constant for all provinces

Table 2

Goodness of fit statistics for models of religious assortative marriage per province

	Model	L^2	df	BIC
1	[main]	184237	544	177500
1a	[main(1938)]	58224	176	56272
1b	[main(1963)]	79440	176	77422
1c	[main(1983)]	46574	192	44410
2	[main][symint]	11624	534	5010
3	[main][symint*prov]	7596	424	2345
4	[main][symint*time]	6462	514	96
4a	[main][symint(1938)]	3019	166	1178
4b	[main][symint(1963)]	2486	166	583
4c	[main][symint(1983)]	957	182	-1094
5	[main][symint*prov][symint*time]	1949	404	-3054
6	[main][symint*prov*time]	235	204	-2291
6a	[main][symint*prov(1938)]	57	66	-675
6b	[main][symint*prov(1963)]	93	66	-663
6c	[main][symint*prov(1983)]	85	72	-727
7	[main][levres*prov*time]	693	340	-3518
7a	[main][levres*prov(1938)]	273	110	-948
7b	[main][levres*prov(1963)]	190	110	-1063
7c	[main][levres*prov(1983)]	230	120	-1122

main: [overall][groom*prov*time][bride*prov*time]
symint: symmetrical interaction of denomination partners
levres: symmetrical interaction parameters using the deviation contrast, and restricted
to 6 levels of outmarriage. The content of these levels depend on the year
concerned; see figure 5 for details

and each year. Allowing the interaction effect term to vary per province in model 3 improves the fit somewhat, but allowing the interaction effect term to vary per year as in model 4 brings about a much stronger reduction in *BIC*. The model is not acceptable by the *BIC* criterion however, so that we must conclude that there are differences between provinces. The breakdown of the interaction between time and the symmetrical association denomination husband/denomination wife shows that the fit of the conditional models 4a-4c improves as time progresses, and that in 1983 a model with no differences between provinces would be quite acceptable.

Models 5 and 6 allow the association between denomination husband/denomination wife to vary with both province and time. Model 5 restricts the differences between provinces to be identical in each of the years (and the differences between years to be equal for each province), and turns out to be the better model of the two according to the *BIC* criterion. It is worthwhile to compare the breakdown of model 6 into conditional models with the breakdown of model 4. Restricting the assortative marriage patterns to be equal for all provinces for the year 1983 results not only in an acceptable model by the *BIC* criterion but in a preferable model. In 1938 and 1963, however, the differences between provinces are quite substantial.

In model 7 we tested whether the restricted association patterns we found for the Netherlands as a whole were also appropriate for the disaggregated tables. We have seen that the assortative marriage patterns are symmetrical, but parameter values for combinations that were near equal in the aggregated analysis may have strongly disparate values per province. This would mean that an aggregated analysis rather strongly misrepresents reality. However, the strongly negative *BIC* for model 7 shows that the levels restrictions hold for the provinces; the parameter values differ but the pattern remains the same. A breakdown of the fit statistics per province (not reported here) showed that the fit according to the *BIC* criterion improved for each province in each of the years, with the exception of Groningen in 1938.
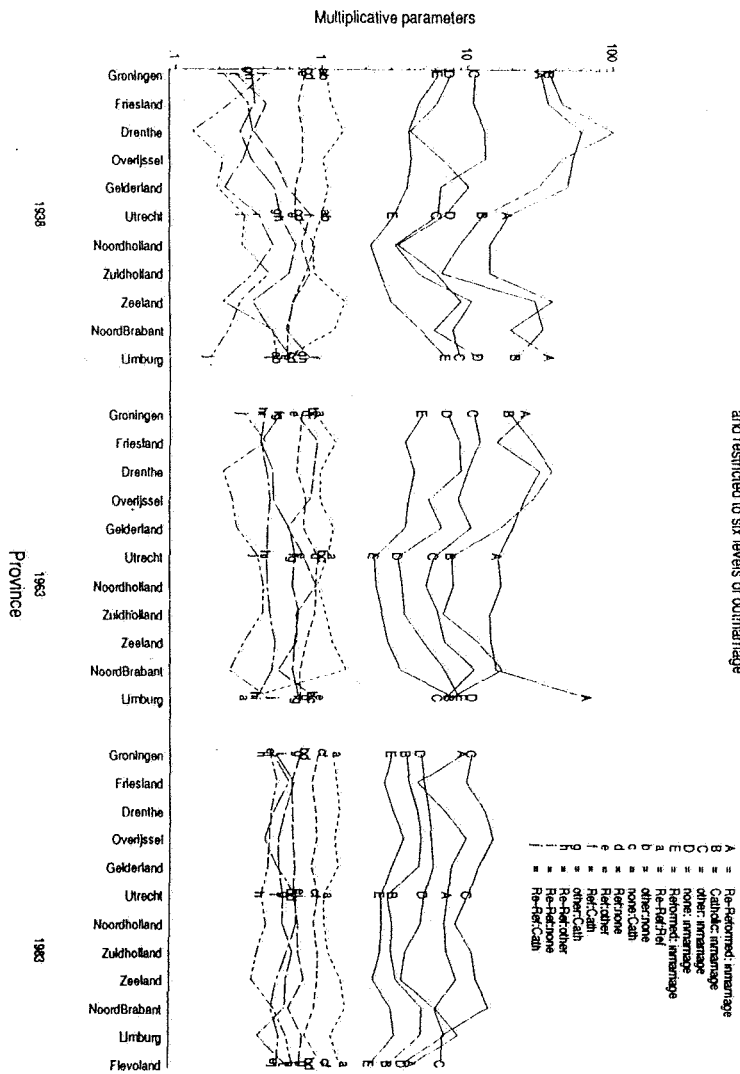
We can conclude that if differences in inmarriage rates per province are ignored, the loss of information is not insubstantial, although differences between provinces have been reduced in recent years. On the other hand, we do not consider the loss of information caused by ignoring differences between provinces to be so great as to completely invalidate results found on an aggregate level.

Differences Between Provinces

Model 7, the best model of the preceding analyses, indicated that analysis on an aggregated level does misspecify assortative marriage patterns, although these differences diminish as time progresses and had disappeared in 1983. Although inmarriage and outmarriage parameters vary between provinces, the outmarriage *patterns* found with the levels restriction in the aggregated analysis were quite appropriate. The model parameters for assortative marriage patterns in 1938, 1963 and 1983 are presented in figure 5. The parameter for Catholic inmarriage in Drenthe in 1938 (value 112) has been clipped to fit the vertical axis. Readers may have to refer to figure 2 for information on the content of the levels in each of the three years.

Figure 5 shows that inmarriage rates tended to be lower in 1938 and 1963 for the provinces Utrecht, Noordholland, Zuidholland than for other provinces. This was

Multiplicative parameters

Figure 5
Religious assortative marriage per Dutch province
for the years 1938, 1963 and 1983
Parameters of a quasi-symmetry model using the deviation contrast
and restricted to six levels of outmarriage

1938

1963

1983

Province

Groningen
Friesland
Drenthe
Overijssel
Gelderland
Utrecht
Noordholland
Zuidholland
Zeeland
NoordBrabant
Limburg
Flevoland

A = Re-Reformed: inmarriage
B = Catholic: inmarriage
C = other: inmarriage
D = none: inmarriage
E = Reformed: inmarriage
F = Re-Ref-Ref
a = Reformed: other
b = Ref:other
c = none:Cath
d = Ref:none
e = Ref:Cath
f = other:Cath
g = Re-Ref:other
h = Re-Ref:none
m = Re-Ref:Cath

especially pronounced for Catholics and Re-Reformed protestants in 1938, although the dip does not take place for the Re-Reformed protestants in 1963 or 1983. There is an unusually high rate of inmarriage for Re-Reformed protestants in Limburg in 1963, presumably due to random factors, since the Re-Reformed group there is very small.

As for outmarriage, figure 5 shows that the combinations Reformed:Catholic and other: Catholic were relatively infrequent in the northern, protestant provinces Groningen, Friesland, Drenthe, and Overijssel in 1938 and 1963. These combinations were relatively high in provinces with a Catholic majority, Noordbrabant and Limburg. The outmarriage parameter for the combination Re-Reformed:Catholic fluctuates somewhat more erratically, but tended to be relatively high in Utrecht, Noordholland and Zuidholland, and relatively low elsewhere. This seems to indicate that in northern, protestant dominated provinces, the protestants tended to be more orthodox than elsewhere in the Netherlands in 1938 and 1963.

Utrecht, Noordholland and Zuidholland have in common a relatively high rate of spatial mobility, indicating that this could be a factor which negatively influences inmarriage tendencies. They are also relatively urbanized and industrialized, which could contribute to mobility or affect inmarriage independently. It is interesting to note that inmarriage rates in Flevoland in 1983 also have the low rate found in Utrecht, Noordholland and Zuidholland. Flevoland has an agricultural economic base but, as a new province on recently reclaimed land, there is of course a very high degree of spatial mobility. This shows that disaggregation can bring to light contextual factors such as spatial mobility, urbanization, industrialization, that affect inmarriage rates. Hypotheses on the effects of these factors will be explicitly tested in future analyses.

CONCLUSIONS

In this paper we took religious outmarriage as an indicator of a more peripheral place of religion in social life, and examined whether a trend towards less religious inmarriage occurred from the end of the 1930s until the early 1980s in the Netherlands. A theoretical examination of the causes of assortative marriage led to the conclusion that, on the one hand, inmarriage is the result of barriers between denominational groups. Individual preferences for partners with similar attitudes influence the formation of homogenous groups. In such groups with a religious identity, differences in subculture can develop into an us/them mentality and into norms encouraging inmarriage and discouraging or forbidding outmarriage. On the other hand, besides barriers between denominational groups, a second group of factors influencing inmarriage can be supply factors: size and regional concentration. Research on religious assortative marriage in the past often failed to deal properly with these supply factors and was therefore unable to show the strength of barriers to outmarriage.

Loglinear models are able to eliminate the influence of supply factors such as size and spatial dispersion and provide parameters relating to both inmarriage and outmarriage rates. The results provided qualified support for a long-term trend to the levelling of barriers against religious outmarriage in the Netherlands. For members of the Roman Catholic and orthodox protestant Re-Reformed churches, inmarriage rates fell sharply from the 1960s on. However, there was no trend

discernable from 1938 to 1958. There was also no trend toward less inmarriage for members of the liberal protestant Dutch Reformed church or in the category "no denomination." Inmarriage for the category "other denominations" rose strongly in the 1970s, probably due to an increase in the number of members of non-Christian denominations such as Islamics in this category. This limits any hypothesis about persistent trends.

The decline in inmarriage for Re-Reformed Protestants closely followed that for Catholics. It is interesting that for the latter denomination, with historically more strict church norms and sanctions, relative outmarriage turned out to be more widespread than for the former denomination. The fact that the trends run parallel indicates that a common factor broke down the ingroup orientation of both Catholics and Re-Reformed protestants.

The trend toward lower inmarriage rates for Roman Catholics and Re-Reformed protestants held for the whole of the Netherlands as well as for its provinces. The provinces with the lowest rates of inmarriage were the western ones. This finding gives impetus to applying loglinear models explicitly including such factors as urbanization.

The limited evidence of a trend toward less inmarriage does not square with earlier findings on other countries, such as those for Canada (Heer, 1962), Australia (Mol, 1973), and the United States (Glenn, 1982). The importance of distinguishing orthodox protestants from liberal protestants found by McCutcheon (1988) was confirmed, although interestingly McCutcheon found no change in outmarriage for conservative protestants and more outmarriage among liberal protestant denominations. This finding that gross outmarriage was lower for Catholics than for Re-Reformed protestants, and relative outmarriage higher, indicates that the technical possibility of misleading results can indeed occur. Re-analysis of the data for other countries could show whether the Netherlands is indeed a deviant case with respect to the trend in assortative marriage. This places questions about differences between countries with respect to trends in religious assortative marriage high on the agenda of those interested in secularization.

NOTES

1. Estimation of models such as this require a program such as GLIM or SPSS LOGLINEAR, that use a design matrix, rather than the iterative proportional fitting algorithm (IPF) used by SPSS HILOGLINEAR, ECTA, BMDP4F. In general, an equality constraint can be imposed on parameters by adding the column of the design matrix for one parameter to that of the other. A difficulty when deviation contrast parameters are used is that certain parameters are redundant; they are not estimated directly but can be calculated afterwards, since the product over the parameters equals 1. It is possible to impose restrictions on redundant parameters, but these manipulations are rather arduous.

We circumvented this problem by defining the parameters on the diagonal as the redundant parameters for the symmetrical interaction effects, since we were primarily interested in imposing constraints on outmarriage parameters. We used SAS PROC IML to generate the design matrix for symmetrical interaction and GLIM to estimate the models.

The data and programs used in our analyses are available from John Hendrickx, Department of Sociology, University of Nijmegen, Postbox 9108, 6500 HK Nijmegen, The Netherlands (E-mail U211310@HNYKUNI1).

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