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Changes of Personal Network Composition and Inter-Group Ties from 1987 to 2005 in Hungary

Abstract The following paper presents the changes and stability of assortative mixing, and inter-group ties in Hungary from 1987 to 2005. The demographic categories under investigation are age, sex, and education. The analysis has a special focus on the rearrangement of the context of tie formation, and the inequality of receiving choices into personal networks along social categories. The most substantial change during the period, is the strong decrease in gender homophily, and some strengthening of intergenerational ties. Both of these findings are in line with the observation that personal networks are recruited more often among the members of the nuclear-family. This latter phenomenon is probably due to the shrinking network size. However, this set of finding is prone to the methodological criticism formulated in the US context, that these observations are in fact the result of the interviewer effect. Finally, the study found stable patterns of educational network prestige, and describes the changes of social capital attached to categories of gender and age.

Keywords assortative mixing, macro networks, homophily

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1 Introduction

The paper investigates the changes of assortative mixing patterns by age, sex, and education in the past twenty years in Hungary between 1987 and 2005. The utilized datasets are nationally representative surveys containing name generator questions to reconstruct personal networks of respondents (Campbell –Barrett 1991). Assortativity, or homophily, the bias to establish social connections between individuals with the same attributes is a well-studied phenomenon in social networks both at the macro and micro levels (Mcpherson et. al. 2001). As a determinant of network structure assortativity effects clustering, bridge formation and for that reason resource flow in networks. The macro structural theory of Peter Blau (1984) assumed that the changing magnitude of assortative mixing over social ties is the main determinant of the extent of unequal distribution of life chances in modern societies.

Although previous findings in the United States over the same time interval reported no change on assortative mixing (Mcpherson et. al. 2006), there are some theoretical insights and empirical trends which suggest that some reconfiguration may have taken place. Studies of marital endogamy over long time periods shows that religion, ethnicity, socio-economic background and education have varying effect over marriage ties, and these changes form

stable trends (Kalmijn 1998). Educational homogamy generally increased in developed countries, while in Hungary it showed a strong increase in the second half of the twentieth century (Uunk et. al. 1996). One may argue that education is a strong predictor of individual taste and socio-economic advancement in contrast with religion and ethnicity, which in fact has lost its importance for marriage formation with time (Kalmijn 1998).This individualization thesis suggests that education sustained its importance or at least did not change in the period. One may also assume that generational difference is an important identity generating experience in modern societies (Mannheim 1952), and because of which cohort homophily raise its prominence. Another relevant line of research is the study of trust. This literature indicates that social ties reconfigured during the transitional period in Hungary and focused on family ties for a trusted network background (Utasi 2002). Utasi argues that the loss of generalized trust and the need for trusted instrumental help increased the prominence of family connections. This latter trend does not only suggest that personal networks may have shrunk in that period, but also that age and gender heterophily (the opposite of homophily) have increased, because family ties bridge generations and sexes.

In the following section I will present the datasets and the methodological approach. The two cross-sectional datasets that are analyzed are the "Miliők" for 1987, and the "Stilusok" 2005. Log-linear models will be used to investigate the main research question. In the third section I provide the basic background information about the change in the ego networks, such as the change in network size, and the social capital attached to different levels of education, cohorts and gender. This section will also show how the network composition has changed in terms of types of relationships. The fourth section contains the test of the main research question.

2 Data and Methods

The dataset from 1987 is created for the Tömegkommunikációs Kutatóközpont (N=2983) by TÁRKI, while the one form 2005 is for the MTA–ELTE Kommunikációelméleti Kutatócsoport (N=1500). Both datasets contain the same set of eight name generators. These questions use the following triggers: 1) discussing important matters; 2) going out together; 3) instrumental help around the household; 4) partners for discussions and hobbies; 5) who can be entrusted for house sitting or keeping an eye on the house at the time of travels; 6) discussing matters of work/school setting; 7) lending money to the respondent; 8) whose opinion is important for the respondent. This list of questions is supposed to monitor both the instrumental and emotional relationships of the respondent. The interview may have gathered information about the maximum of five distinct individuals (alters) that the respondent (egos) mentioned for one name generator, which means that the theoretically largest network is 40 alters.

Both questionnaires contain information about the gender, age, schooling, occupation of the alters (the latter is not investigated here) and their relations to ego, whether they are kin, members of the nuclear family, co-workers, neighbours, friends. The final dataset in 1987 however registered this information in an aggregated fashion at the respondent level (i.e. number of males, children etc. in respondent's network). Because of this, one cannot perform multi-variable analysis of alter characteristics. Moreover, the occupation of alters is not retained in the final dataset, because FEOR codes are not translatable in this aggregated way.

The variables in question are categorical, and for this reason long-linear modelling is utilized for statistical testing (Knoke – Burke 1980). Two types of models are specified. One is for testing the independence of ego (E) and alter (A) characteristics (assortative mixing,

intergroup relations model). Using the marginal notation it is: {A}{E}. The second type of model is testing temporal (T) change: {AE}{AT}{ET}. It has to be noted that these models do not test assortative mixing *per se*, because they test the cell structure of the overall table, not specified regions (see Mcpherson 1981, 1987 for such long-linear models). Moreover, these models also fail to take into account the phenomnon that some groups are over or under represented in networks as choices of the respondents (this will be analyzed separately in the next section). This latter phenomenon would require that margin A had the same distribution as margin E that is the hypothesis would be that the choices along with social categories have the same distribution as the individual identities (i.e. the number of female egos is the same as the female alters).

The entries in the table are choices of respondent types for alter types, so the unit of analysis is a dyad, not a respondent. This approach would result in a substantial increase of observations, which would unreasonably enlarge the sample for statistical testing. To avoid such a bias the tables are reweighted in a way that the sum of cell entries are added up to the original size of the sample.

3 Network Size and Composition

The network size shrank from 1987 to 2005 from 6.11 connections to 3.9 (table 1). The change is substantial, 36%. The magnitude of the change is similar to which Mcpherson and his co-authors (2006) reported in the US within the same period, however, the proportion of the respondents who did not report any connections is relatively small in Hungary, it increased from 1.6% to 3.8%. This finding can be the subject of the same criticism that is formulated against Mcpherson's and his associates' results, namely that it is a result of interviewer effect and fatigue (Fischer 2009, Paik–Sanchagrin 2013). The pattern of the finding is nevertheless different. In the General Social Survey the number of respondents without discussants was significantly larger, which was the main target of criticism suggesting that some interviewers skipped the name generator entirely during the interview. It is also a difference, that there was only one name generator in the General Social survey, while eight in the datasets under study, but no any other module that would put a lot of burden on the interviewer and interviewee. Although it is hard to apply the same critical argument to the Hungarian case, but one would make a claim that the attitude toward social surveys changed in the 20 year period under study in both countries in a negative way, which may affect the information available in both cases in a similar way.

	Max.	Mean	S. Dev.	% of respondents with 0 ties
1987	30	6.11	3.48	1.6
2005	19	3.9	2.52	3.8

Table 1 ❖ *Network Size*

The change in the types of ties between 1987 and 2005 is in line with the decreasing trust hypothesis too. Respondents in the latter period more heavily rely on the nuclear family, while wider social circles lost their importance (figure 1). Although friendship relations sustain their importance in the period (almost 25% of all connections are friends in both time period), the role of kinship, and especially co-worker and neighbourhood relations is decreased. This finding about the rearrangement of the personal core networks to a focus on the nuclear family at the expense of workplace ties and extended kinships is in line with the findings for the first decade of the transitional period (Angelusz–Tardos 2001).

Angelusz and Tardos (1991) found in the 1987 Miliők dataset that alters have higher prestige in terms of educational attainment than their alters. They called this phenomenon the network prestige effect. This can be considered as a form of social capital for those in the favoured

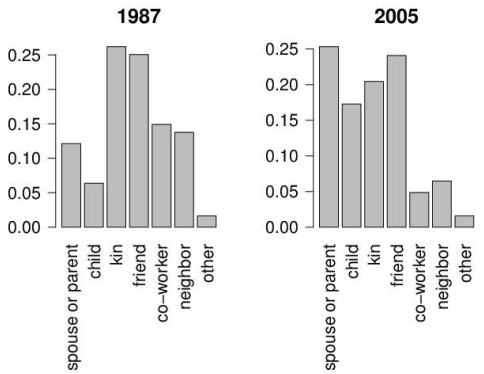

Figure 1 ❖ *Relationship types*

social category. Chosen by many people as a trusted individual accumulate social capital for the focal person. Varga (2012) found the same pattern in a sample from 2003. In short, the previously mentioned study found that alters with higher levels of education, young middle aged individuals and males appear more often in the networks, while seniors, females and less educated appear less often. The applied name generator technique here differs from both studies. Previous studies focused on the five most important discussants, and it is quite probable that the approach catches alters that ego considers highly competent, or that show some representative value (Small 2013). The study from 2012 utilized a single name generator which was inquired about discussants with whom the respondent discuss "important matters", while the 1987 dataset used information about a smaller set of individuals who are "especially important" for the respondent beside its "close family". However, this dataset contains information about a wider selection of connections, including connections with instrumental value and social support. This set of name generator might gather information about those who have more free time to convert into social capital, and those who might have other convertible skills for instrumental help around the household. Therefore, the representative prestige effect, that Angelusz and Tardos observed (1991) is maybe less pronounced in this context.

Figure 2 reports the differences between

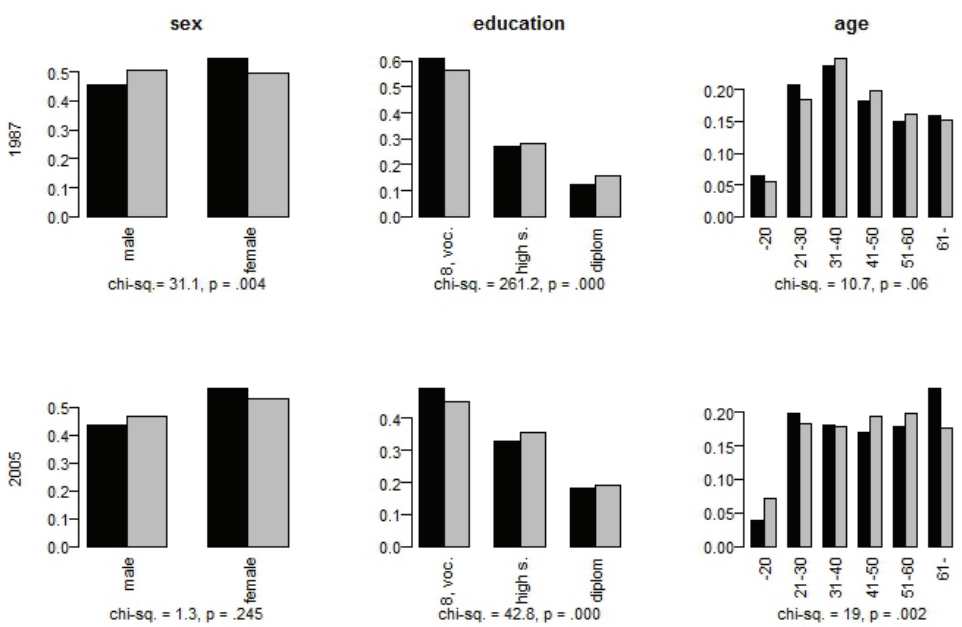

Figure 2 ❖ *Social Capital of Macro Groups: Percentage of Alters and Egos of the Given Attribute. Test of the same distribution of ego (black bars) and alter (grey bars) attributes are reported under each figure.*

sex

1987

Temporal change model. log-likelihood ratio s. = 36, df=1, p = .000

	male	female
male	0.34	-0.34
female	-0.34	0.34

Assortative mix. model. log-likelihood ratio s. = 303.59, df=1, p= .000

2005

	male	female
male	0.14	-0.14
female	-0.14	0.14

Assortative mix. model. log-likelihood ratio s. = 26.05, df=1, p = .000

education

1987

Temporal change model. log-likelihood ratio s. = 3.75, df = 4, p = .439

	8 y. or vocational	high-school	diplom
8 y. or vocational	0.90	-0.12	-0.78
high-school	-0.13	0.24	-0.11
diploma	-0.77	-0.12	0.89

Assortative mix. model. log-likelihood ratio s. = 603.93, df = 4, p = .000

2005

	8 y. or vocational	high-school	diplom
8 y. or vocational	0.91	-0.13	-0.78
high-school	0.02	0.18	-0.20
diploma	-0.93	-0.04	0.98

Assortative mix. model. log-likelihood ratio s. = 347.57df = 4,p = .000

age

1987

Temporal change model. log-likelihood ratio s. = 26.57, df = 25, p = .3677

	-20	21-30	31-40	41-50	51-60	61-
-20	1.78	0.24	-0.52	-0.22	-0.67	-0.62
21-30	0.20	0.94	-0.04	-0.23	-0.16	-0.71
31-40	-0.46	0.13	0.60	-0.15	-0.16	0.03
41-50	-0.42	-0.29	0.08	0.49	0.02	0.11
51-60	-0.85	-0.16	0.02	0.09	0.64	0.27
61-	-0.25	-0.86	-0.15	0.01	0.33	0.92

Assortative mix. model. log-likelihood ratio s. = 587.86, df = 25, p = .000

2005

	-20	21-30	31-40	41-50	51-60	61-
-20	1.61	0.39	-0.66	-0.08	-0.63	-0.61
21-30	0.26	0.95	-0.13	-0.07	-0.09	-0.91
31-40	-0.02	-0.16	0.86	-0.47	-0.09	-0.12
41-50	-0.01	-0.37	-0.14	0.49	-0.18	0.21
51-60	-0.79	-0.01	0.02	-0.11	0.65	0.24
61-	-1.05	-0.80	0.05	0.25	0.35	1.19

Assortative mix. model. log-likelihood ratio s. = 369.86, df = 25, p = .000

TABLE 2 ❖ Assortative Mixing in Time. Cell entries are interaction effect parameters. Grey scale indicates relative coefficient size within a table.

the respondents' and their alters' distribution along the categories of sex, age and educational levels. Despite the previously mentioned methodological differences, the observed patterns do not differ markedly from previous findings. Educational network prestige and the higher prestige of males follow the same pattern as in the earlier studies, and they are very stable across time. In 2005 the distributional asymmetry of male and female egos and alters is not statistically significant, probably because of the substantially smaller sample size, but it is true that the distribution is more balanced. The cohort differences are much less stable across the ages. In 1987 the individuals under 31 were less likely to be chosen by respondents, while older cohorts except the oldest were more likely to be chosen. However in 2005 the age profile was more complex and the differences between ego and alter age profiles were more extreme. This can be partly caused by the smaller sample size (few observations in the edges of age distribution). The oldest and youngest cohorts are the most and least likely to be in personal networks compared to their relative presence in the sample. This pattern is in harmony with previous findings too for that period (Varga 2012). Individuals in their forties and fifties (potential parents) seem to be in a bridging position, they were overrepresented as alters in both period.

4 Testing Temporal Change of Assortative Mixing Patterns

Table 2 reports the temporal change of assortative mixing. The table entries show the association of all categories within the feature of age, sex, and education. Only the tables of sex differ significantly in the two periods. Sex homophily decreased during the examined period, the networks are more mixed in terms of gender. High school degree seems to bridge educational categories, as this one has the smallest homophily coefficient, and the largest off-diagonal parameters. Although the overall ego-alter choice table of education did not change significantly between 1987 and 2005, one can note that the category of high school educated got closer to primary school and vocational school and farther from those with a diploma. As it has been mentioned earlier, alter choice patterns in terms of age did not change during the period. Homophily seems to have a U shaped curve, where young and old generations exhibit more assortative mixing. Although there was no statistically significant association with time, it seems that in the later period intergenerational ties have been strengthened between the cohorts of 20 year difference in many cells that would be in line with the previously described findings of strengthened family ties.

5 Conclusions

This analysis suggests that personal networks shrunk from 1987 to 2005, although the possibility of interviewer effect on that matter cannot be ruled out completely. The networks have focused more on the nuclear-family in the latter years rather than on co-worker, neighbourhood or extended kinship ties, and this may explain the few changes in intergroup ties. Gender homophily has decreased substantially, and there is some evidence that inter-generational ties have grown stronger. Both of these phenomena are in line with the changing sources of social ties. The basic structure of assortative mixing patterns did not change in the cases of education and age, which runs contrary to the individualization/modernization thesis, and long term patterns of marriage homogamy. Age has a U shaped homophily structure: younger and older generations are more homophilious than middle aged individuals. Among educational groups high school graduates have a bridging role with smaller homophily. Some social categories are able to collect more choices into personal networks, and this difference between groups exhibit both stable and changing patterns. Higher educational attainment provides more

social capital in that sense in both time period, while being male decreased this sort of benefit across time. However, cohort inequality in that sense grew from 1987 to 2005.

This analysis had many limitations. I do not want to make a strong claim about shrinking network size, because the same observation for the same time period in the US context received a lot of criticism, and deciding this question requires more scrutiny both in terms of analytical sophistication, and data gathering (Fischer 2009; Paik – Sanchagrin 2013). Moreover, I have suggested interpretations of changing structures even in the absence of statistical validation. I would like to emphasize that the questions of intergroup association patterns could be analyzed in a more nuanced log-linear framework in the future, if someone found this line of research worthy for continuation. Lastly I would like to point out that the problem of smaller networks in 2005 and the described changes in network composition and assortative mixing are interlinked. Either the networks have really become more centred on the family, which would explain the other detected changes, or the smaller network is an artefact, and the previously mentioned changes of assortative mixing is due to an interview bias. The bias would be that interviewees first reported family members, and the interview stopped artificially, and other, extended, and more homphilious ties are muted. ❋

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