Ethnic diversity and polarization in Vojvodina[1]

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Abstract

From a methodological perspective, this paper aims to demonstrate that ethnic diversity can be an objectively measurable notion, thus multi-ethnicity may have its own 'units of measurement'. However, while the Hungarian geographic literature has concentrated by now on only the fragmentation (i.e. 'Ethnic Diversity Index'), another type of diversity should be also defined: the phenomenon called polarization when two or maximum three ethnic groups with nearly equal population number are present. Using the so-called 'ethnic polarization index' our paper emphasizes that the increase or decrease of diversity cannot be described as a two-dimensional process. Thus in our case study of Vojvodina not only the homogenizing and diversifying territories are outlined, where the minorities are shrinking, and conversely where the minorities increase their rate at the expense of the majority. Since both homogenization and diversification can result in polarization, it does also matter, which way the balance will shift regarding polarization. Taking into consideration the broad scale of potential impacts of ethnic polarization on social, economic and political spheres (e.g. on the risk of conflicts), we find it important to underline that human geography and sociological research in the future should focus on the polarizing territories as well which have been defined in our study.

Keywords: ethnic diversity, polarization, Vojvodina, Serbia

Introduction

The issues related to the coexistence of groups with different ethnic, religious and cultural background have long been in the forefront of human geography. In Hungary, due to its peculiar history, ethnic studies have been given special

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attention not only in geography but also in many other sciences. A renaissance of ethno-cultural studies took a fresh start in the last decades of the 20th century, when many saw the motives for future conflicts in the cultural fault lines instead of the ideological opposition of a bipolar world (Huntington, S.P. 1996).

A number of international conflicts have recently occurred with different intensity and at various levels in which the ethnic, religious or 'civilizatory' factors cannot be neglected (Yugoslav conflict, Rwandan conflict, Middle East set of conflicts, Caucasus etc.).

The ethnically diverse or polarized societies can become an integral part of social tensions in the so-called 'Western, developed' world too, particularly through the ever-increasing migration, which largely diversified the once single-faced societies in the past decades.

Our work aims to find out what results can be achieved by using statistical and mathematical methods to explore a traditionally multi-ethnic and multicultural region, and its ethnic transformation. Is generalization possible by using mathematized studies, can these devices help the researcher or the decision-maker and if so, where are the limits of these methods? As the actual field of study, we have chosen a region, Vojvodina in Serbia, which claims to have one of the most heterogeneous ethnic structures in Southeast Europe and where significant ethnic changes took place in the past decades.

Measurement and practical use of ethnic diversity

In its original sense, diversity means the species diversity of living organisms at the various levels of biological systems (Hawksworth, D.L. 1995, 6–7). In other words, 'the mathematical quantitative representation of biological diversity,' whose extent can be determined by methods based on statistical distributions (geometrical, logarithmic etc.) or probability calculation (Majer, J. 1993, 177–203; Magurran, A.E. 2004, 100–130). The first attempt by the social sciences to exactly measure ethnic and linguistic diversity was the so-called 'ethno-linguistic fractionalization index,' also known as the Herfindahl index (Taylor, C. and Hudson, M.C. 1972), originally applied by ecologists to measure the biological species diversity.

The method which has become known in Hungary as the 'ethnic diversity index' (Bajmócy, P. 2004, 2009; Reményi, P. 2009; Németh, Á. and Šolks, G. 2012; Németh, Á. 2013) indicates the chances that two randomly meeting inhabitants of a given area have different ethnic origins. The values could vary between 0 and 1: while 0.00 suggested a homogeneous ethnic composition, 1.00 showed a perfectly heterogeneous composition when each inhabitant of the settlement belonged to a different ethnic group.

$$EDI = \frac{L*(L-1)/2 - \sum_{i=1}^{n} e_i * (e_i - 1)/2}{L*(L-1)/2}$$

where L = population of settlement/area, e_1, e_2, … e_n = number of persons belonging to the ethnic groups, EDI = Ethnic Diversity Index (BAJMÓCY, P. 2009).

The widespread use of the method started in the 1990s, when the research into the social effects of ethnic and religious heterogeneity, in connection with the rapidly diversifying population of Western European and North American states, was increasingly brought into the spotlight (e.g. MAURO, P. 1995; EASTERLY, W. and LEVINE, R. 1997; REILLY, B. 2000/2001; COLLIER, P. 2001; ALESINA, A. *et al.* 2003; FEARON, J. 2003; MONTALVO, J. G. and REYNAL-QUEROL, M. 2005). The potential effects on political structures, economic development, social cohesion, educational systems, the risk of conflict development etc. have since been fiercely debated in the literature.

But whatever conclusion is drawn by the case studies and models, a special type of ethnic diversity almost always emerges in one way or another: the case of polarization. In recent decades, more and more researchers recognized that not only (or not primarily) fragmentation can directly or indirectly influence the various spheres of society but also a high degree of polarization when two or maximum three ethnic groups with nearly identical population are present. Without taking sides in this extremely complex and rather sensitive issue, we would like to highlight only a few aspects below to prove that ethnic geography in the future should focus on research into not only fragmentation but also polarization.[3]

Ethnic diversity is generally described in the literature as a phenomenon with dual nature: it can be a potential resource but also a risk factor for the states at the same time. An open and plural society experiences diversity as a basically positive, inspiring phenomenon. The mixture of ethnicities and cultures, and the practical realization of multiculturalism are considered by some researchers as morally necessary and particularly useful from a pragmatic point of view (KYMLICKA, W. 1998, 2007). As well as this approach minimizes the risk of conflicts, it can positively influence the performance of economy and the labour market (e.g. FLORIDA, R. 2002; FLORIDA, R. and TINAGLI, I. 2004).

In addition, theorists supporting multiculturalism often argue – typically relying on examples from metropolises – for the elimination of segregation and the creation of residential areas with mixed ethnicities. They assume that this form of coexistence protects, on the one hand, the minority groups

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[3] The first use of 'polarization index' in Hungarian geographic literature as well as the method applied in this paper (parallel analysis of diversity and polarization indices) is described in greater detail in the PhD thesis of NÉMETH, Á. 2014.

and the district itself from being stigmatized, and on the other hand, it can contribute to the catching up of disadvantaged groups by strengthening the network of relationships (Gijsberts, M. *et al.* 2012, p. 528). If ethnic diversity also means the mixture and the parallel existence of languages, the inhabitants will automatically and involuntarily become multilingual. Although societies in Central and Eastern Europe still often find it necessarily bad, it is in fact an incredible competitive advantage in the global labour market against those who grew up in a homogeneous, multilingual environment. Accordingly, these regions can/could be viewed as areas capable of offering a valuable, potentially qualified, multilingual labour force. Also, the mixed ethnic composition is mostly coupled with a colourful and vivid cultural life, which can occasionally constitute a tourist attraction, being another serious competitive advantage in this dynamically developing sector of economy.

However, some of the economists studying the effects of ethnic diversity believe that ethnic *fragmentation* undoubtedly involves certain extra costs. In the case of less developed states with smaller financial capacities, it can be an aspect of key importance. Also, heterogeneity often negatively influences economic growth in an indirect way (e.g. Mauro, P. 1995; Easterly, W. and Levine, R. 1997; La Porta, R. *et al.* 1999; Tavares, J. and Wacziarg, R. 2001; Alesina, A. *et al.* 2003). One of the reasons can be that it is usually harder for ethnically fragmented communities to find a cooperative solution to the emerging problems, and they are more likely to waste available resources on fighting for various particular interests (Alesina, A. *et al.* 1997; Habyarimana, J. *et al.* 2007). In a *polarized* society it can invite a form of behaviour which is known as the 'theory of rent-seeking' in the economic literature, and which is considered a particularly damaging social phenomenon.[4]

On the other hand, the social and economic problems may involve more severe *political* consequences by that people sometimes interpret what are social problems of a different origin as ethnic problems. In other words, the tensions frequently break out along ethnic fault lines, even in cases where previously ethnic issues were apparently less remarkable (Fearon, J. and Laitin, D. 2000). Therefore in certain cases, ethnic *fragmentation* can lead to political instability.

There are researchers who go even further and claim that diversity in certain conditions can increase the risk of eruption of ethnic conflicts or even civil wars. In Richard Hartshorne's classic theory the ethnically, religiously,

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[4] If the benefit is not generated naturally but created artificially, e.g. by government measure, competition will arise for the benefit, and the resources which the companies use to grab the benefit – e.g. in the form of lobbying – will be wasted from the society's point of view – Lőrincz, L. 2007. In return, this 'competition' is usually more likely to sharpen in polarized communities than in homogeneous or fragmented ones (Montalvo, J. G. and Reynal-Querol, M. 2005, 293–294).

and mother tongue-wise heterogeneous population (without mathematizing diversity) is one of the most significant centrifugal forces that can influence a state (Hartshorne, R. 1950; Pap, N. 1999). In return, by a negative feedback, this can have further damaging effects on the economy, since e.g. the uncertainty in domestic politics can significantly decrease the size of foreign capital investment (Montalvo, J.G. and Reynal-Querol, M. 2005, p. 308). A number of researchers, however, think that this issue is not determined by the extent of ethnic fragmentation but rather *polarization*. Horowitz, D. (1985), e.g. points out that civil wars unfold relatively rarely in homogeneous and heavily fragmented (i.e., highly diverse) societies. The biggest tensions usually break out where there is one or maximum two influential minorities next to the dominant majority, i.e., where polarization is perceivable.

A similar conclusion was drawn by Collier, P. (2001, p. 130) and Bates, R. (1999, p. 31) who think diversity does not increase (to the contrary, it decreases) the risk of conflict generation, and it does not negatively influence the performance of economy. Montalvo, J. G. and Reynal-Querol, M. (2005) directly apply the ethnic polarization index to emphasize that on a global scale there shows a definitive correlation between the extent of social polarization and the development of ethnic conflicts.

The potential effects of diversity on *social cohesion* are possibly even more intensely contested than the previous ones. Leigh, A. (2006) and Putnam, R.D. (2007) claim that in ethnically *fragmented* urban districts, mutual trust and solidarity is lower, and the tendency to assist and cooperate is usually weaker. Other researchers, however, reject this hypothesis and argue that in the European context there is no evidence that ethnic diversity in itself undermines social cohesion (e.g. Tolsma, J. *et al.* 2009; Hooghe, M. *et al.* 2009, 528–529). Therefore there is no consensus, and it is not surprising either that several theories of the problems have recently been published (summarized in: Gijsberts, M. *et al.* 2012).

The so-called '*homogeneity theory*' claims, e.g., that people mostly seek contact with people who are culturally similar to them, thus interaction in ethnically and religiously mixed communities is usually less and more superficial. This is related to '*social control theory*' which claims that if the social norms accepted as common values are missing from the community, mutual distrust can easily prevail.

With the accumulation of other adverse conditions, social control may stop, leading to the overall deterioration of public safety. This is in sharp contrast to 'contact hypothesis' which emphasizes the positive effects of heterogeneity. Its motive is the tolerance developed by mutual understanding, which can ideally result in the strengthening of solidarity and mutual trust. All this will inspire the individual who can become open, culturally richer, and thus socially more successful.

The fourth, so-called '*competition theory*', though without actually naming it, in fact examines a potentially negative effect of *polarization*. The theory claims that the rise of suspicious, hostile attitude between ethnic groups can merely be triggered by the significant increase of the number of members belonging to the 'other group' (e.g. QUILLIAN, L. 1995). 'The closer they are' and the more there are of 'them,' the more probable that people's sense of threat intensifies, they see the situation as competition, and they will retreat under the 'protective shield' of their own group. This hypothesis states that the rise of ethnic polarization, whether intended or not, generates an imaginary or real competitive situation between the ethnic groups which can imply the splitting of micro communities and the weakening of social cohesion.

Like us, no one claims that ethnic fragmentation or polarization in itself could determine any social pattern of effect. However, most researchers agree that in analyzing complex social, economic and political processes, the phenomenon of ethnic fragmentation and polarization cannot be neglected as important but never exclusive factors.

The ambitious research projects of the recent past have therefore pointed out that ethnic polarization should not be seen merely as a form of diversity but a particular quality that is equivalent to homogeneity and the perfect heterogeneity. This theoretical basis forms the starting point of our work. In our assumption the change in diversity is a process that cannot be described as a two-dimensional motion. Both homogenization and diversification can, depending on the initial status, result in polarization; and conversely, if the extent of polarization decreases, the ethnic structure may shift toward both homogenisation and fractionalisation. A simplified model of the relation between diversity and polarization (with the same number of ethnic groups) is shown in *Figure 1.*
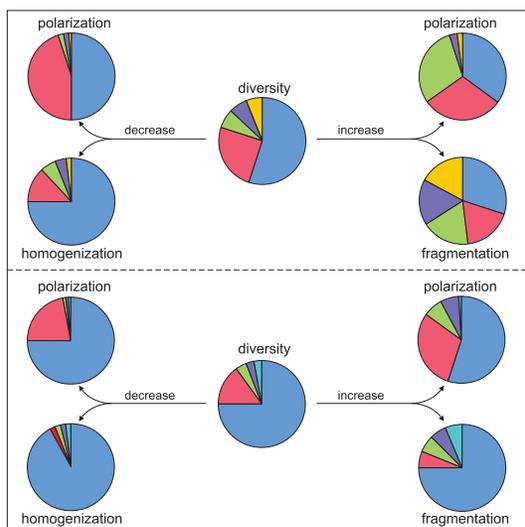
Considering the broad scale of potential social impacts of ethnic polarization, it is not surprising that by the late 1990s the need emerged internationally to exactly define and measure polarization. The simplest way is classification based on the percentage rates of majority and mi-

Fig. 1. A simplified model of the change of diversity and polarization based on a hypothetical society (NÉMETH, Á. 2014, p. 28)

norities (Reilly, B. 2000/2001). Fearon represented each country by a rectangular coordinate system, indicating the rate of majority on the x-axis, and the rate of the largest ethnic minority on the y-axis (Fearon, J.D. 2003, 206–208). The closer these points were to the vertex (0.5, 0.5), the more bipolar the society was.

A more sophisticated definition of the extent of polarization uses a different logic: the 'ethnic polarization index' (*EPI*) can be determined by the normalized distance of a particular distribution of ethnic groups from a bimodal distribution. The deviation of each group from the maximum polarization share of 0.5 is weighted by the group's own share (Montalvo, J. G. and Reynal-Querol, M. 2005; Alesina, A. and La Ferrara, E. 2004)[5]. In Montalvo and Reynal-Querol's index the received values can also vary between 0 and 1 but the index reaches its maximum if the given society is divided between two equally populated groups (at that point the diversity index is 0.50); thus the state of perfect polarization has emerged. After this point, however, the two curves will behave differently: with the increase of fragmentation, the extent of polarization gradually decreases. If each person of a settlement with 100 inhabitants claims to be of a different ethnicity, the state of perfect fragmentation and, concurrently, the state of perfect diversity have been reached, while the extent of polarization will converge to zero.

It also means that theoretically every *EPI* value can be associated with two states. The ethnic polarization index will be, e.g., 0.40 if the rate of ethnicities stands at 88.8%–11.2%, but also when the society is fragmented into nine equally populated ethnic groups. The *EPI* can be calculated with the following formula:

$$Q = 1 - \sum_{i=1}^{N} ([0.5 - \pi_i]/0.5)^2 * \pi_{i,}$$

where, π_i = share of group i in the whole population, Q = Q-index or Ethnic Polarization Index (*EPI*).

The relation of these two parameters of ethnic diversity is shown in the figures below. The letters on the x-axis in *Figure 2* show a hypothetical state where a = 1 ethnic group with 100 persons; b = 2 ethnic groups with 50 persons; c = 3 ethnic groups with 33 persons; … j = 10 ethnic groups with 10 persons; k = each member of the population belongs to a different ethnic group. If the *EDI* and *EPI* values calculated for each area unit are represented by a rectangular coordinate system (*Figure 3*), the result will be the following: the polarization index is highly correlated with fractionalization at low levels of *EDI*, uncorrelated at intermediate levels, and negatively correlated at high levels (Alesina, A. and La Ferrara, E. 2004, p. 28).

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[5] A special case of the polarization index (Esteban, J.M. and Ray, D. 1994) controls the distances between the groups, in other words it uses continuous measures of distances (Desmet, K. *et al*. 2009, 1294–1299).
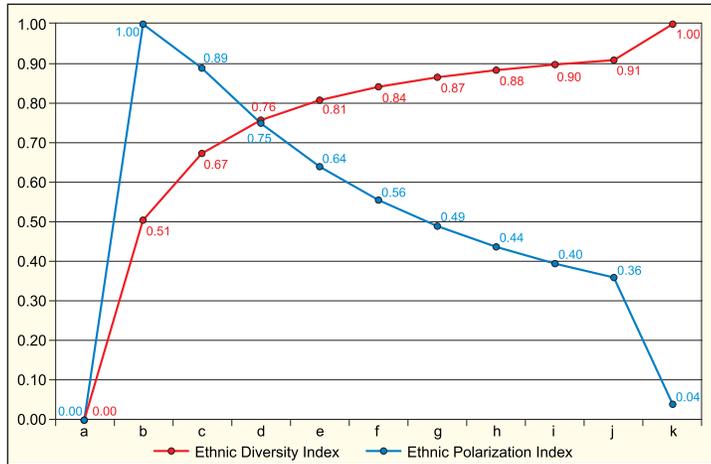
Fig. 2. EDI and EPI values related to each other in the case of a community with 100 inhabitants (Németh, Á. 2014, p. 26)
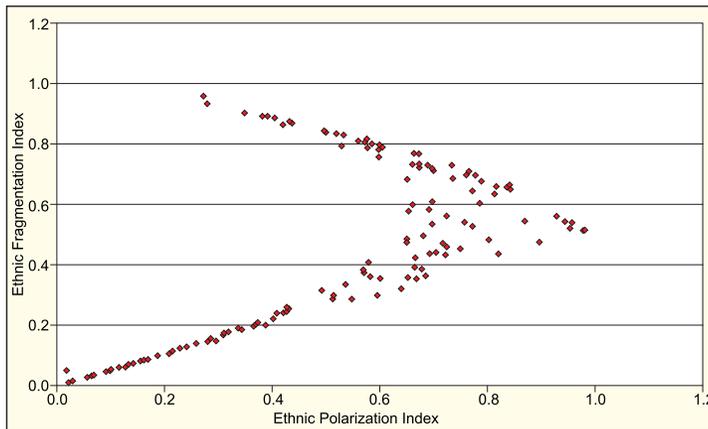

Fig. 3. EPI related to EDI (in other words 'fragmentation index') exemplified by the states of the world (Montalvo, J.G. and Reynal-Querol, M. 2005, p. 307)

Based on the points arranged in a typical V-shape on the graph, we are able to create types; however, only units with medium or high diversity index are worthwhile for such an analysis. The reason for it is that at low values (around *EDI* < 0.40) the correlation coefficient is extremely high, the points are arranged in a linear order, it makes no sense to create groups. Nevertheless, this method helps identify the two different forms of diversity, which can be further analyzed by an automated dimension-reducing procedure (e.g. cluster analysis). The analysis can

also be made dynamic by displaying the change between two points of time. In that case, four categories can be created based on ΔEDI and ΔEPI which reflect the modification of ethnic structure according to the directions shown in *Figure 1*.

The method has the same flaws and imperfections as every other mathematical method similar to it. The contrast between the postmodern, soft definitions of ethnicity (pl. Barth, F. 1969; Jenkins, R. 1997; Brubaker, R. 2001) and the analysis of naturally rigid statistical data can possibly be termed the most fundamental set of problems of the research. While the diversity and polarization indices can classify each individual under a single category, ethnic identity in modern societies must not be considered a static fact but rather a dynamic category which can be changed by emotional and rational aspects. This makes addressing individuals with dual or multiple identities problematic.

The different interpretation of the basic notion itself (ethnicity) in space and time may be misleading too. Mainly, it extremely complicates comparability as the notion of 'ethnic group' appears differently e.g. in the US and Ugandan statistics, not to mention countries where such data are not even collected. One must not forget about the fault factor arising from the uncertainty of data collection, which typically characterized the older statistical publications. Therefore some researchers argue that these indicators often reveal as much of the individual phenomena as they also hide. We, however, believe that the statistical data and the quantitative methods based on them, despite all their faults and imperfections, should continue to form an important part of ethnic research, since the interpretation of processes in a geographical space and the non-microregional studies are only conceivable in this framework.

Ethnic transformation in Vojvodina

Based on the ideas proposed above, the following is the study of a typical Central European multicultural space and its significant ethnic changes in the past two decades, presented to illustrate the theoretical considerations above.

For centuries, Vojvodina has been one of the ethnically most diverse macro regions of the Carpathian Basin (Kocsis, K. 2006; Gulyás, L. 2005) (*Figure 4*). Three dominant ethnicities (Serbian, Hungarian and German) and many smaller but significant groups lived here at the dawn of the 20th century. During the 20th century, however, a large-scale ethnic homogenization took place continuously, but particularly in two big waves (following the 2nd World War and after 1991) (Kocsis, K. *et al.* 2006; Léphaft, Á. 2011a; M. Császár, Zs. and Mérei, A. 2012). In our ethnic studies we use the official results of the last three censuses (1991, 2002 and 2011), partly on settlement level and partly on municipality level, which will be used to calculate the diversity and polarization indices as well as their changes with the above devices, to be assessed later on the basis of our field experiences.
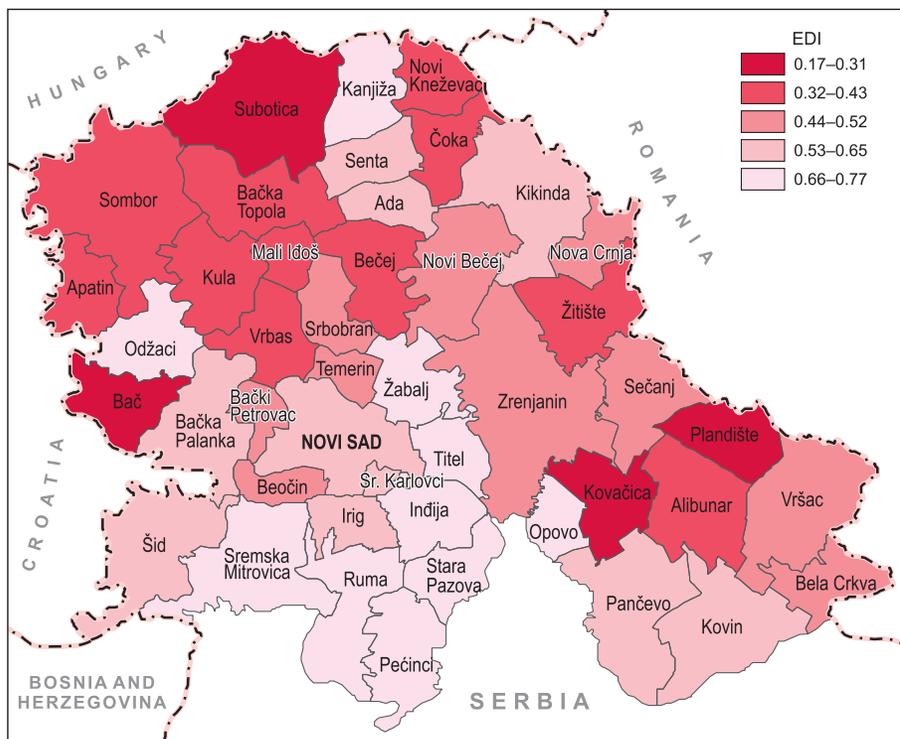
Fig. 4. Ethnic composition of Vojvodina according to the 2011 census, based on preliminary data of the Statistical Office of the Republic of Serbia. Cartographic methodology is partially based on the 2002 map of the province (Kocsıs, K. and Kıcošev, S. 2004)

Ethnic homogenization in Vojvodina

As already mentioned, the ethnic homogenization of Vojvodina took place continuously in the 20th century. However, its intensity has varied in time (*Figure 5*) as well as in space.

Between 1991 and 2011, Srem and Western Bačka became the most homogeneous territories. Degrees of ethnic homogenization on the level of municipalities are significant, the change in the ethnic diversity index can reach -0.22, which can be described as a huge change, since this scale of ethnic transformations could generally be seen only in the former Yugoslavian municipalities involved in armed conflicts. This outstanding value is primarily observable in the settlements along the Belgrade–Novi Sad axis. In the case of Western Bačka, the level of homogenization is lower, the change of the index is between -0.00 – -0.16. The primary cause of the above processes is the
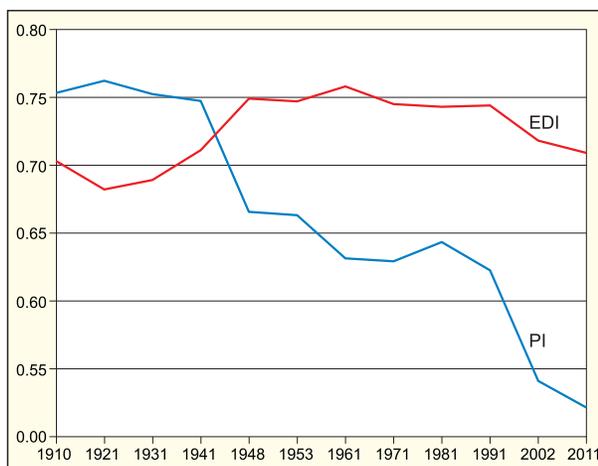
Fig. 5. The relative change of diversity and polarization indices between 1910 and 2011 in Vojvodina

Serbian immigration and the departure and decreasing ratio of Hungarians, Croats, as well as other small ethnic groups. The drastic decrease of the rate of 'Yugoslavs' also fuels the change (*Figure 6*).

The immigration of Serbs originates from two processes: it is caused, on the one hand, by the Serbs flown to Serbia during the wars accompanying the breakup of Yugoslavia, and on the other hand, by the attraction of one of the most important axes of the country between Belgrade and Novi Sad, as well as the agglomeration of these two cities. The latter is much more like a natural economic migration fitting within the classic urbanization theory, and it explains why we were able to measure outstanding homogenization values in the mentioned region.

To some extent, the above logic can be used, although with opposing values, to explain why the south of Banat, though ethnically diverse, has barely changed. The urbanized municipalities such as Vršac (0.80) and Pančevo (0.14), which exceed the regional average of South Banat in terms of their development level, the latter being a functional part of the Belgrade agglomeration, experience larger homogenization in which both refugees and spontaneous migrants play a part. In the case of others, in spite of the basically diverse structures, which therefore allow ethnic homogenization, the level of ethnic homogenization is low. One of the possible reasons is the region's relative backwardness and poverty, i.e., compared to the Belgrade–Novi Sad axis it is a less attractive target area for migration, therefore substantially less immigrants arrive here, and even the Serbs are leaving the region in large numbers because of economic or development issues.
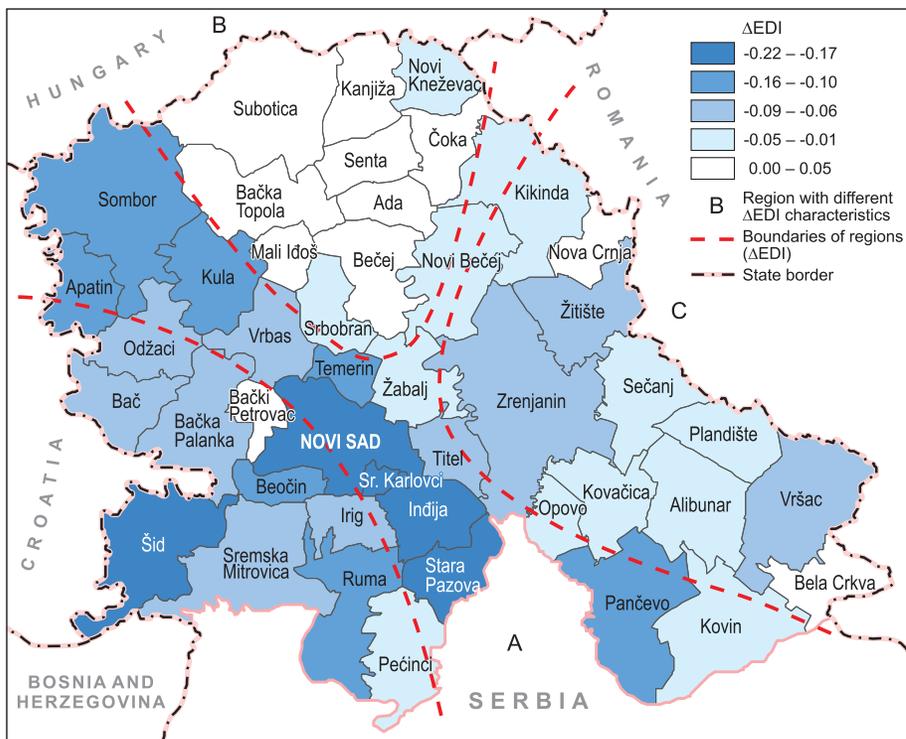
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Fig. 6. The ethnic homogenization of Vojvodina's municipalities between 1991 and 2011 based on the ethnic diversity indices calculated from the results of official censuses. A, B and C = detailed explanation is in the text

The middle part of Banat, the Žitište–Zrenjanin–Titel strip shows an above-average rate of homogenization compared to the southern part of Banat mentioned above (the change of the ethnic diversity index in all three municipalities is 0.7, rounded). The homogenization of Zrenjanin, the third most populated city of Vojvodina, is of central importance. The western part of the strip (Titel) still belongs to the Novi Sad agglomeration and all three municipalities take a significant number of refugees.

On the edge of the Hungarian block, where the Hungarian ethnicity has become a minority, slow homogenization can be observed (-0.005 – -0.03), and the block with Hungarian majority has been diversifying at an almost similar rate – i.e., a slight Serbian immigration and a larger scale of Hungarian emigration/assimilation are under way. As a result of the above processes, 3 regions with different characteristics can be defined in terms of ethnic diversity in Vojvodina (see *Figure 6*):

A) A rather homogeneous (on Vojvodina's scale) and further homogenizing southern strip was formed, as the result of the Serbs' permanent northbound migration. It is a Serb-dominated zone South of the Odžaci–Žabalj–Kovin bend. Here the Serbs today form minimum three-fourths of the municipality's population almost everywhere with a couple of minor exceptions (Bački Petrovac, Beočin, and Kovačica). The region – as the rate of ethnic minority groups is low – is not characterized by ethnicity-driven conflicts.

B) On the North a transition zone has been formed, the area of the narrowly defined ethnic boundary, where on the level of municipalities, generally no ethnic group claims a majority of over two-thirds. The ratio of the majority ethnicity varies between two-thirds and 50% (again with one or two exceptions, e.g. in Kikinda the ratio of Serbs reaches three-fourths of the total population). This zone is the Bela Crkva–Sombor strip, whose northern side is Hungarian–Serbian (Subotica, Mali Iđos, Bačka Topola, Bečej), the middle strip today is already Serbian–Hungarian (Srbobran, Temerin, Novi Bečej, Nova Crnja). The southern part has been until today mosaic-like, mixed Serbian–Hungarian–Romanian (Žitiste, Plandiste, Sečanj, Alibunar), and the western part is Serbian–Croatian–Hungarian, in which other locally significant ethnic groups appear too (Rusyns, Montenegrins, Slovaks).

This whole ethnic status is already the consequence of a Serbian influx occurring in several waves, the Hungarian–Serbian inter-ethnic conflicts of the recent past are mostly associated with this zone. This is the strip where significant ethnic transformations took place in the past decades in a way that the ratio of minority-bound Hungarians is still considerable (around 30%), but there is a new and growing Serb majority. This is also the region where the members of both groups display 'border-mentality' (Ilić, V. and Keveždi, M. 2012), the region ethnically being a real frontier, where both communities experienced great changes in their position: from majority to minority and to minority from majority within one generation (see the case of Temerin – Nagy, I. and Tátrai, P. 2013).

These changes then create frustration in many among the communities. The presence of competing extremist groups from both sides (Serbians and Hungarians) also points to the transition zone (Léphaft, Á. 2011b) that best fits the previously mentioned 'competition theory'. It must be emphasized that quantitative methods (as census data generally) are not able to distinguish domicile and recent migratory subgroups, however in the latter case the potential of conflict is presumably higher.

C) A shrinking area chipping at the edge with Hungarian majority along the river Tisza. Here assimilation, emigration and the slow but steady Serbian immigration brings about a not too high but constant ethnic diversification. On the edge where the Hungarian bloc connects the transition zone described above a new confrontation is forming, a new frontier zone is being

born. Taking into consideration the potential effects of ethnic polarization on social cohesion, the Hungarian–Serbian tension could heighten across this zone, while the conflicts on the former frontier area could gradually stop.

Comparing the 2011 values of ethnic diversity (*Figure 7*) and polarization indices with those of 1991, it can be concluded that the Serbian ethnic group, due to the significant immigration and the shrinking of non-Serbian communities, set out to homogenize the southern band of Vojvodina and the former ethnic boundary which lay there in 1991, shift it to the North, narrow the Hungarian majority areas from the south and connect the formerly insular Serbian ethnic enclaves (Odžaci, Žabalj, Titel, Zrenjanin).

However, by splitting the 20 years under examination, it can be observed in many places (e.g. Kikinda, Srbobran, Novi Bečej, Nova Crnja) that the ethnic homogenization of the war period (between the censuses in 1991 and 2001) is significant because of the Serbs' immigration, but in the period between 2001 and 2011 a counter-process is under way although on a smaller
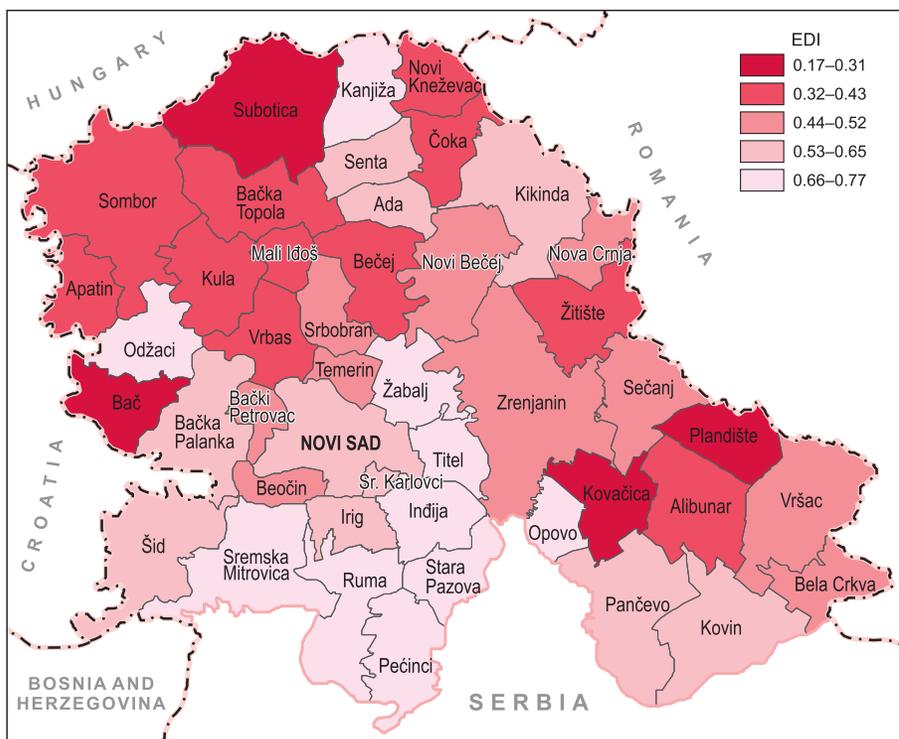

Fig. 7. The ethnic diversity indices of Vojvodina's municipalities in 2011 based on the official census results

scale. Some regions have re-diversified, mainly as the result of the rapidly decreasing Serbian population due to low birth rates and economy based emigration from the region (either to urban centers within Serbia or to abroad).

Ethnic polarization in Vojvodina

Both homogenization and diversification can result in polarization, depending on the initial status. And conversely: if polarization decreases, the ethnic structure can shift toward both homogenization and fragmentation. This is clearly visible by studying the ethnic transformation of Vojvodina in the 20th century. Between 1910 and 1921, the diversity index rose while the polarization index dropped, i.e., the ethnic structure of the region became more and more fragmented.

Between 1921 and 1948 (intensively between 1941 and 1948) the diversity index decreases and the polarization index rises, i.e., the structure becomes increasingly bipolar with the shrinking of small ethnicities and mainly the German population, and the further increase of the most numerous Serbian ethnicity. In the following period, the processes generally point toward homogenization, i.e., both indices, though not steadily, start to decrease, which clearly indicates the development of homogeneous ethnic structures.

At the same time, the different pace of change in the two indices also means that next to the Hungarian minority, the rate and significance of other groups are decreasing. Thus homogenization is much faster-paced than polarization, but the former one is caused only to a smaller extent by the decrease of Hungarians, and to a greater extent by the decreasing population of other non-Serbian ethnicities.

Classification of Vojvodina's settlements based on ethnic diversity and polarization

Using cluster analysis (K-means cluster) in our research, we were able to separate seven types based on the 2010 ethnic diversity and polarization indices (*Figure 8*). It clearly shows that nearly half of the settlements have a diversity greater than 0.50, i.e. the mathematical midpoint of the diversity scale. Additionally, the majority has a polarization index bigger than medium. That is, despite the continuous ethnic homogenization during the 20th century, the local ethnic diversity of the region is still significant.

Based on the result of cluster analysis projected onto the map, four different types of space can be separated that are important to us (*Figure 9*):

a) The settlements of the Belgrade–Novi Sad axis and Srem can be characterized, with very few exceptions, by low polarization and diversity indices, since practically this is the only unbroken area of population growth
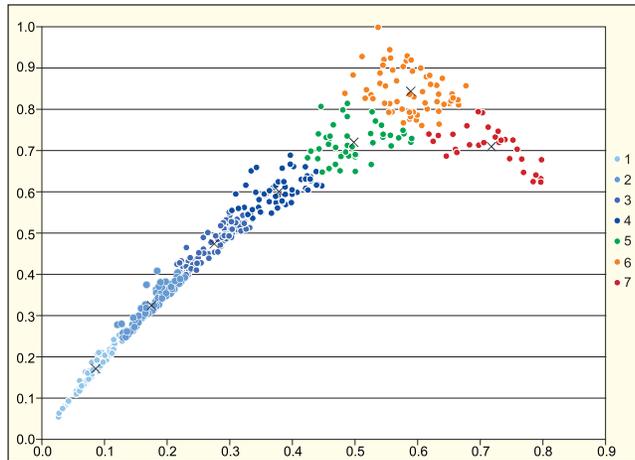
Fig. 8. Grouping of Vojvodina's settlements by cluster analysis based on ethnic diversity and polarization. 1–4 = linearly increasing diversity and polarization (positive correlation); 5 = more diverse and polarized than the average (no correlation); 6 = diverse, more polarized (no correlation); 7 = diverse, more fragmented (negative correlation)

of the last two decades which almost exclusively brought about the decline of the rate of minorities and the rise in the population and rate of Serbian majority. This includes both the immigration of Serbs and the departure of non-Serbs (mainly Croats).

b) Western-Bačka. It is well observable in the region that both the polarization and diversity indices show a higher value than in Srem, and there are more values standing out of the basically low averages concerning both indicators. Compared to the above process in Srem here the increase of the rates of the (Serbian) majority are lower, which are nourished by, along with the Serbian immigration, the parallel losses of rapidly aging minorities. The settlements of the region having no ethnically dominant group can be described to be rather polarized than diverse.

c) In the north-eastern part of Vojvodina ethnic blocs (Hungarian along the Tisza, Serbian around Kikinda) are characterized by low index values, the ethnic composition of settlements is not so much homogeneous as dominated by one ethnicity. On the edge of blocs (predominantly on the external boundaries of the Hungarian bloc) in the mixed ethnicity zones we can see high, sometimes extremely high, polarization and diversity values. This narrowly defined Hungarian–Serbian ethnic contact zone has become today the primary field of ethnic competition, which according to field experiences and patterns of media reports (LÉPHAFT, Á. 2011b) coincides with the areas of inter-ethnic frictions.
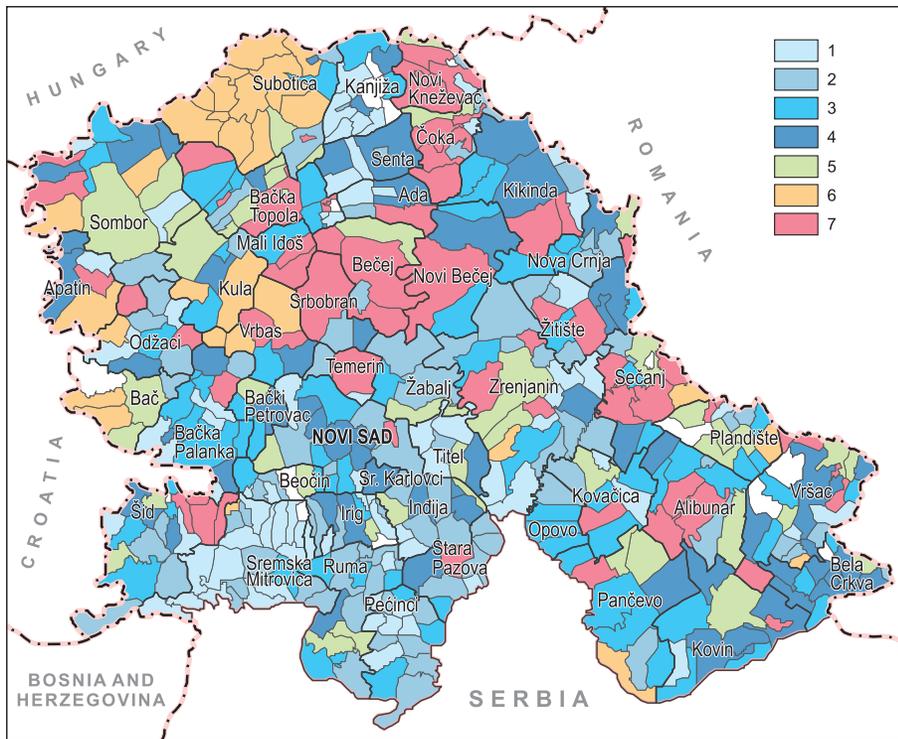
150

Fig. 9. The spatial distribution of the grouping of Vojvodina's settlements based on ethnic diversity and polarization using cluster analysis. (The 7 categories and the colour scheme are the same as in *Fig. 8)*

d) Befitting the history of Banat, the south-eastern part of Vojvodina still displays an extremely mosaic-like image, a number of ethnic groups live here in sporadic islands, ethnic enclaves, as well as many multiethnic settlements have survived too. As a result, the indicators we studied also show a diverse, vivid picture. The parts close to Belgrade have already become Serbian-majority, so both of their indicators in question are low. However, the border and inner peripheries (Deliblato sand plains, Begej-Tisza wetlands) have still retained their diverse and polarized population.

Types of ethnic transformation on the basis of diversity and polarization

If we study the ethnic changes and not the current situation the settlements of Vojvodina can be divided into four basic groups, according to how much the change in ethnic diversity and polarity affects them (*Figures 1* and *10*).
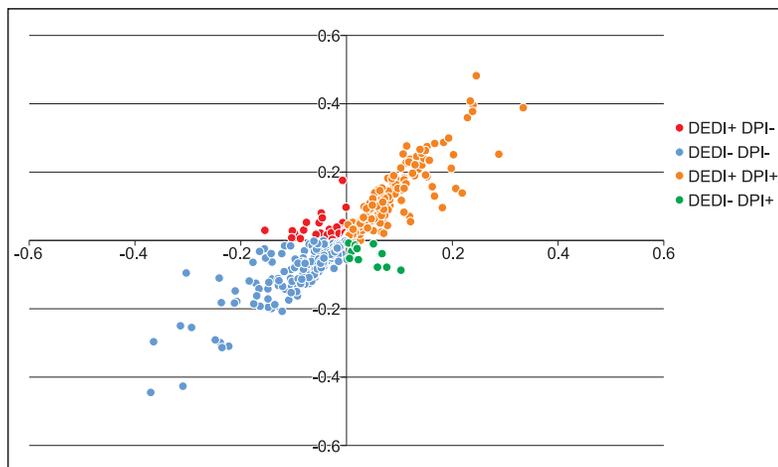
Fig. 10. Classification of Vojvodina's settlements based on the ethnic diversification and polarization. Diversification value is shown on the x-axis, polarization on y-axis. ΔEDI– and ΔEPI+ = decreasing ethnic diversity but increasing polarization; ΔEDI– and ΔEPI– = decreasing diversity and decreasing polarization (homogenization); ΔEDI+ and ΔEPI+ = increasing diversity and increasing polarization; ΔEDI+ and ΔEPI– = increasing diversity but decreasing polarization (fragmentation)

The upper left quarter contains settlements whose ethnic diversity is decreasing, i.e. being homogenized, but meanwhile the ethnic polarization index increases. Typically, it occurs in cases when a previously diverse, multiethnic society is becoming bipolar. In practice, this affects 15 settlements in Vojvodina, being the third most common type *(Figure 11)*.

Generally, while the rate of Serbian majority increases and the minorities "become homogenized": the relative weight of small ethnicities decreases, and that of the largest minority (generally Hungarians) increases. It can generally be stated that next to Serbs and Hungarians at least one other minority is present in significant number (Bač – Croats, Slovaks; Kovačica – Romanians, Slovaks; Kula – Montenegrins, Rusyns) and this situation is 'becoming simpler' due to ethnic changes.

Concerning the settlements in the lower left quarter, both diversity and polarization decrease, therefore it is the simplest and most common case of ethnic changes. It can mainly be observed when the dominance of the majority is gaining strength, and/or the weight of the dominant minority decreases. In Vojvodina, it affects territories where the development and strengthening of Serbian majority have progressed. A heavy immigration has been under way, the minority communities have disappeared, and the places have become a part of the Serbian bloc. Affected are Srem, which experienced the most intensive ethnic transformation of the past decades, and the settlements of the Belgrade–Novi
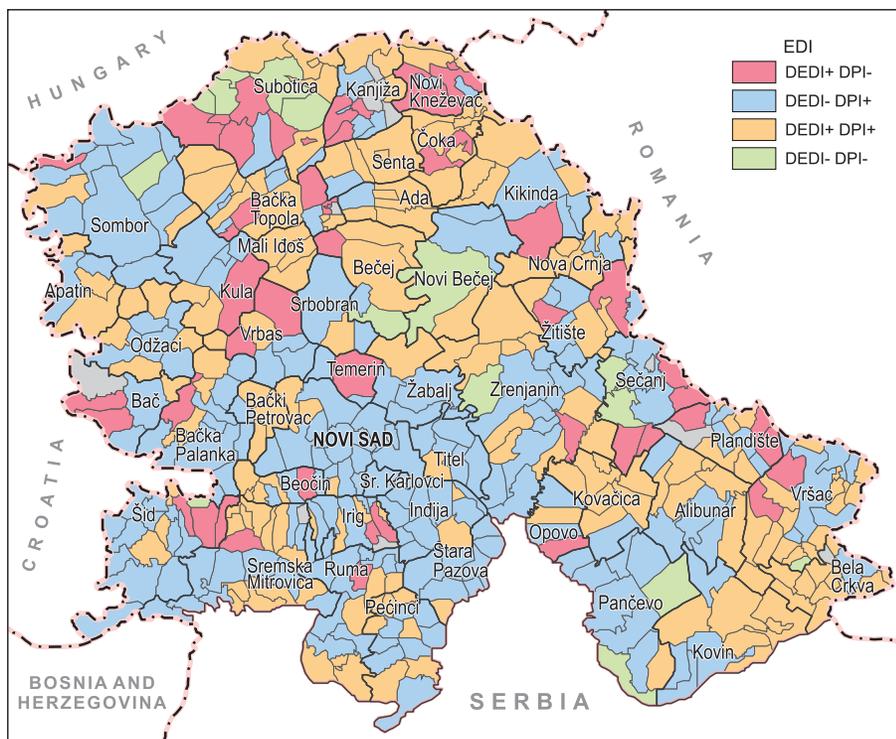
152

Fig. 11. The regional distribution of four groups formed on the basis of ethnic diversification and polarization values of Vojvodina's settlements. (For legend see *Fig. 10*)

Sad axis. Although to a lesser extent of polarization, similar processes take place in Western Bačka, which is the extension of the previously described axis.

The settlements of the upper right quarter are simultaneously diversifying and polarizing. This is the second most common type with 189 settlements. Society becomes varied; transformation is rather pointing toward polarization, i.e. one other or maximum two groups are formed and gain strength next to the dominant ethnic group. Concerning Vojvodina, these are districts where the majority is not Serbian (either Hungarian or Slovak) but there is significant Serbian immigration because of which they are still not the majority, so the ratio of local majority decreases and that of local minority increases. Most of the Hungarian bloc at the Tisza belongs here as well as the primary territories of Slovaks or Romanians. In this category a special role is attributed to settlements which are losing their Serbian majority population, and at the same time the ratio of minorities (specifically the Roma population in many cases) is on the increase.

The ethnic structure of settlements belonging to the lower right quarter is diversifying while polarization is decreasing. These cases suggest the fragmentation of society: the percentage rate of ethnicities becomes relatively balanced, or at least it moves into that direction. Actually, those settlements belong here which are multiethnic and it is not the population of the largest ethnicities that grows. These include, e.g. Ivanovo and Svetozar Miletić, where the number of Serbs rises, who in 1991 formed only the third largest community behind the Hungarian and Bulgarian groups in the former and the Hungarian and Croatian groups in the latter, whose population count has conversely decreased. There are several cases when the number of Serbs has increased parallel to the shrinking of a dominant minority (Novi Bečej, Dolovo), but a number of other smaller groups have appeared in place of Yugoslavs.

Conclusions

In our paper we presented the applicability of diversity and polarization indices in the study of ethnic transformations. These methods can, regardless of ethnic groups and observing the current uncertainties of input data, help to form an objective and comparative picture of the most important ethnic changes of an area. Our paper emphasizes that the increase or decrease of diversity cannot be described as a two-dimensional process, since both homogenization and diversification can result in polarization. As previous research pointed out, distinguishing between the two subtypes of ethnic diversification (fragmentation and polarization), due to the broad scale of their potential social impacts, is a particularly important task. Methodologically, it can be considered the most important innovation of the research, since both the Hungarian and the wider Central and Southeast European literature of ethnic geography has concentrated on only one type as yet.

Therefore the use of the method made it possible to trace, while the previous results and the demographic trends of the given period made it possible to prognosticate, where and how Vojvodina's most important ethnic processes occur. Obviously, the different scales show the trends with different details: interethnic conflicts are best studied on the settlement level, while analysing the migration accompanying a regional conflict requires a larger scale. Therefore we analysed two levels of public administration: municipalities and settlements.[6]

Nevertheless, in our case study of Vojvodina the homogenizing spaces are well outlined, where the majority population continuously prevails and

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[6] Next to the ratios themselves, it has to be taken into consideration that the Serb ethnicity had suffered a loss of significant masses by 2011, and for ideological reasons, the content of the category 'other' of the census has also changed. Due to the parallel losses and transforming identities, the observable changes are often relatively small in terms of statistics.

minorities are shrinking; and the diversifying territories too where one or more minorities increase their rate at the expense of the majority population. On a more general level, it is typically some kind of manifestation of the Serbs' prevalence, who also forms the majority on a regional level, since what is diversification in a settlement with non-Serbian majority is often the direct result of the shrinking Hungarian, Slovak, and Romanian etc. communities. It does matter, however, which way the balance will shift regarding polarization. Therefore within the two basic types, we separated the settlements whose composition shifted toward fragmentation or even polarization during the last twenty years.

Groups of settlements with high polarization indices overlap with spots of Hungarian–Serbian conflicts which in recent years have been publicized (and deemed ethnically based) by the press, and which were previously collected by Léphaft, Á. (2011b). This is reason why we find it important that further field studies and other qualitative methods in the future should purposely focus on polarizing spaces, where the deepening of ethnic tensions can be anticipated the most.

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