

CARTOGRAPHY IN THE FACE OF SOCIO-CULTURAL TRANSFORMATION OF GLOBAL POPULATION - SOME REMARKS ON THE BACKGROUND OF PROJECTED ICA ATLAS

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ABSTRACT

Cartography as the discipline is being influenced by the development of new methods of geo-data obtaining. At the same time statistical data are presented on the maps using traditional methods.

In the paper the necessity of extending the set of methodological solutions to present actually very important demographic characteristics has been underlined. As an example of such possibilities author has proposed legible equidemic form of presentation of educational divisions within African societies as well as two simple systems of designations usable for modelling 16 and 9 types of three-component structure of population.

1. INTRODUCTION

Maps are the excellent windows to observe and recognize the very rich list of spatial connections characterising various elements from environment of human life. Among many natural and artificial components of this environment just the population of people as a composition of different groups is of primary importance. When a single man is a subject of interest of psychology, demography's special field lays in investigations of the groups of people named "cohorts". Cohort is a subpopulation living in a certain territory and characterised by temporary accordant "demographic or social events" [1] such as birth, beginning of education or working, maternity, marriage, death. Above all most of the maps illustrating spatial distribution of given groups of people refer just to cohorts defined in this way because of very limited character of accessible source data. Results of officially leaded permanent documentation are obtained in listed form as demographic indices, indicators and various types of abstract statistical characteristics referring to administrative or political divisions of given territory. Maps presenting the typical groups of subpopulations create in regional as well as global atlases separate parts titled "demography".

But not only the mentioned above kinds of criteria determine significant for "state of human life" divisions in the frame of population. The very new effect of human groups' influence on global change of natural environment, as well as more and more disorders of balance observed within different subpopulations living in the same territory turn governments' and international organisations' attention towards transformative meaning of sociological inequalities not only in the local but even in the global scale. To the list of such well recognised distinctive attributes: the race, language, denomination, participation in customary oriented culture, political preferences, nationality and educational level can be included. Broadly disseminated question of men/women inequality according to such an world authority as Charles Tilly can be analysed not by speaking of "sex" in reference to X and Y chromosome – linked biological differences but "gender" – in reference to social categories mentioned above.

Tilly [2] attributes the creation of paired and unequal categories into two crucial mechanisms, which he calls exploitation and opportunity hoarding, and their maintenance to two others, emultion (when existing organisational models or social relations are transparented from one setting to another) and adaptation (when people create routines that depend on categorically unequal structures). It can be noticed that within many even great modern atlases sociological diversity of population is still represented rather sporadically although categorically distinctions arise and their role in peoples' life is really important for the reason on rapid global communication.

2. SOCIO-DEMOGRAPHIC MAPS AND ATLASES

Cartographic reliable presentation of issues connected with global distribution of human groups, distinguished according to sociological attributes, may be considered as a true challenge for two reasons. The first is temporal diversity of structural change within population in different side of the globe. Accessible data are derived from censuses

not synchronised with various fastness of these processes, or – from thematic in not coordinated and territorially very limited queries organised by scientific societies and various social and political bodies on several levels.

Socio–economic data are collected either continuously, in samples or in censuses. Apart from the fact that most countries still have population censuses organised every 10 years as well as agricultural ones every 5 years, there are organised various manufacturing industry censuses and company censuses.

In case of the censuses connected with population suitable characteristics are collected for as high a percentage of the population as possible. As these original statistical data are the subject of privacy regulations before whichever form of publication they are suitable transformed: combined, averaged or collected for administrative or other units.

According to Kraak–Ormeling opinion [3] the second barrier constitutes area–referred system of original data. Most of information are accessible after statistical transformation of source data in an area–blocked form, comprehensive and operationally usable for governments, political or social institutions or management services. But for cartographers such administrative or, in the higher level of consideration, political division of territory appears often not corresponding with distribution of feature to be presented on a map . It is evident that confessional or racial divisions of population living in a given territory are not always determined by administrative borders or political conditions.

It is perfectly known cartographic problem of dependence between right harmonisation of the area–referred, indirectly transformed data, choice of cartographic method of presentation as well as selection of graphic symbolism and expected accuracy for supposed map’s function.

Release from arbitrary determined division of territory which has to be mapped may be attained by applying isopleth or dot method of presentation. In many cases of terminally disagreement data it is necessary to refer information on a map to the time interval between the earliest and the latest source of data.

As a specially complicated problem the indistinct character of many categories basic for the determination of suitable subpopulation can be remarked such categories as black/white, male/female, married/unmarried, citizen/not citizen usually remain incomplete in two regards: first, some people (persons of mixed race, transsexuals, certified refugees) do not fit clearly on one side of the line or the other; and the second in many situations the distinction between the members of any particular pair does not matter [2].

3. PROPOSAL OF DEMOGRAPHIC WORLD ATLAS

Constituting, in the frame of ICA, the Working Group on Women and Cartography was connected with understanding of the importance of the question of more active participation of women in public cartographic life and international organisations. Since General Assembly of the ICA in Barcelona, when WG on Women and Cartography was transformed into ICA Commissions on Gender and Cartography profile of commission’s activity significantly enlarged, embracing besides of women other “underrepresented” groups. This direction appears corresponding with other collaborating with cartographical “sister” commissions within FIG and Geographic Union.

For young cartographers and researchers from developing countries the limited number of ICA travel scholarships for assistance and presentation of work at the International Cartographic Conference of ICA have been granted. It can be noticed that actually among seven vice–presidents of ICA – four positions have been admitted to women.

One of the point of “Gender and Cartography” commission’s programme for the term 1999–2003 was to make a review of thematic atlases devoted to “women” question in regional and global scales, to consider the need and possibility of preparing new world “women” atlas in the frame of ICA. After broadly conceived searching on national (China, India, Poland, Sweden, Turkey) and global level and in the face of the fact of the very new, revised second edition of excellent Joni Seager’s atlas titled: “The state of women in the world atlas” [4] members of the Commission considered pertinence of undertaking a task of preparing ICA demographic atlas which should present not only women but also chosen underrepresented groups of people important from social or cartographical point of view. During commission meetings in Ottawa (1999), Budapest (2000) and Beijing (2001) the general foundation of the atlas has been discussed.

The first chair of the commission and actual co–chair Eva Sikierski proposed the title of projected atlas as follows:

“ICA Demographic World Atlas

selected issues related to:

- A. Under–represented Groups
- B. B. Groups with Special Cartographic Needs”

To the first, general part of the atlas, gathering maps presenting global distribution of the basic underrepresented human groups and also chosen regional maps of features especially important just for these regions have been included. First part of the atlas should answer different social and political organisations needs.

Closely limited function has to be assigned to the second part of the projected atlas. Global and regional pictorial review of the diversification of potential users of special cartographic needs should be a practical guide for authors, researchers and editors interested in this very specific fields. Moreover, individual maps should serve as an important source of information for different official bodies and social services or institutions.

The idea to link efforts of several commissions/working groups within ICA to consider the rich branch of cross-commissions problems connected with “maps for special users” was firstly formulated during Stockholm’s International Cartographic Conference of ICA by Andrew Tatham, heading of ICA Commission on Maps and Graphics for Blind and Visually-Impaired People. Organized in Poland in 1998 seminar confirmed the need and effectiveness of collaboration in this field within ICA [5]. Preparing the second part of projected atlas seems to be a suitable occasion to cross-commission activity.

The general part of the atlas has to be completed with numerous regional or national insertions presenting chosen demographic problems of most rapidly changing sides of the globe. The Polish members of the ICA Commissions on: “Gender and Cartography” and “Cartography and Children” have prepared the insertion “Poland” representing groups of East and Central European countries after transformation of the political system. The number of next insertions is not limited, depending only on actual demographic spatial distribution’s changes.

4. INSERTION “POLAND” OF PROJECTED ICA ATLAS

Insertion “Poland” consists of two parts according to basic content’s division laid down for a whole projected ICA atlas. To the first part nine tables presenting logically followed issues connected with underrepresented groups of various subpopulations living in Poland have been included. The priority has been given to categorisation of human groups according to the, defined by Tilly [2], “gender-oriented” division.

The second part of the insertion “Poland” consists of nine tables (presenting rich collection of maps and graphics). As the most important group of people “with special cartographic needs” children divided into several age-groups have been distinguished. Among these subpopulations various groups of impaired pupils, considered often relatively to their perceptively important sex-distinction, have been separated.

To each of the tables the full-page of text commentary complemented with tables, graphs, statistics and other explanatory information referring not always only to Polish territory but treated in regional or even global scale have been added.

Polish insertion to projected ICA atlas has been prepared in electronic form in both Polish and English versions. Positive opinion of ICA Executive Committee after the presentation of incomplete paper version of insertion during 20th International Cartographic Conference (Beijing, 2001) as well as acceptance of majority of methodological and graphical proposals by several authorities gathered on pre-conference seminar “about national and regional atlases” (organised by chair of ICA commissions Timothy Trainor and the Chinese Academy of Sciences) create the real conditions to improve the final form of the whole collection of maps, which should be the first model insertion of projected ICA Demographic World Atlas.

The preparation of the insertion “Poland” has been realised owing to the financial support given to the Department of Geodesy and Photogrammetry of the Agricultural University of Wrocław by Head Office of Geodesy and Cartography, represented by General Surveyor of Poland: actual, who participated in 19th ICC in Stockholm as well as his predecessor during 20th ICC in Beijing.

5. GENERAL REMARKS AND PROPOSITIONS CONCERNING WITH PROJECTED ATLAS

The specificity of projected atlas lies in the fact that human groups which should be shown on the maps are considered not always in accordance with cartographic rules of generalisation. It can be noticed that traditional global demographic maps present spatial distribution variety of subpopulations in the frame of given population with lack of attention to minorities. Even dot (or symbols) method very rigorously limits the number of persons in the group, which could be shown in the map.

In the new ICA world atlas, the methodological barriers, limited choice of demographic presentation of the diversity of population only to the maps in a large scale, should be overcome. Besides the traditional solutions it is possible to apply of multiscale background of dot method [6] as well as cartograms realising, in the form of choropleth or symbols map,

“value-by-area” scaling of reference area [6, 7, 8, 9]. These types of modelling are derived from the method of variable-dense net of reference units which sizes are inversely proportional to the density of the presented feature.

To exemplify rationality of the mentioned above method, the “value-by-area” map of educational differentiation living in Africa is presented on the Figure 1.



Figure 1. Children at school age in Africa

The sources of data, as usually, have been referred to the countries within the continent. The children in school age have been considered as the whole population. This population has been divided into two subpopulations: educated and not educated children. Reference area of each country within the continent is scaling in considered “population scale” not accordingly to the proportional share of the whole continent’s size. Sometimes product of modelling characterised by the lack of Euclidean scaling is known as “geocomposition”.

Symbols located inside differentiated reference area representing particular countries are presented as figures representing one of the subpopulations in the same scale as the whole populations. Proposed modification of symbol method seems to be very appropriate for readability perception of the “spatial” distribution of children’s accessibility to education in Africa. The map preserves the main properties of a model because the basic map’s function is a relation between a number of educated and number of not-educated groups of children and not at all – relation between the number of educated children and the size of territory where they live. The reference area creating the whole background serves as an information thematically closely related with designations situated within these units. Map’s user can directly recognise the structural division of children in each of the countries.

The shape of the whole continent and topologically correct lay-out of reference area in represented countries (or blocked into region group of countries) allows to identify a place to which information led from the map is referred. Of course for the facility of map’s reading, the additional system of word explanation relating to the identification information has been applied.

It is certain methodological inconvenience that anamorphic model can not always be created. If the difference between distributions of: subareas within the region and of suitable subpopulations is very significant the visual effect of anamorphical transformation may cause that the map will become illegible. Disqualification of model is for reason of break in basic topological of rule is not preserving of neighbourhood between subareas being necessary condition of object's identification within a whole territory.

Presented in the Figure 1 solution to the problem of direct graphical comparison of two subpopulations composing of considered population is methodologically more rationalised and perceptively less complicated than traditional one, applying two different scales of modelling: one – for the reference area (according to the distribution of sizes of particular countries within the continent) and another – for the presented feature (according to the number of educated children).

Social category as a criterion of division of the certain population into two subpopulations may be chosen in accordance to the different interests of future map's users. Sometimes the lack of actual and complete data is the barrier to reliably and accurate cartographic presentation of all factors influencing important demographic changes in the world [3]. The Table 1 gives the average age of the latest internationally available data for the three key indicators: the under-5 morality rate, the net primary school enrolment/attendance rate, and the percentage of under-5s who are underweight in Sub-Saharan Africa.

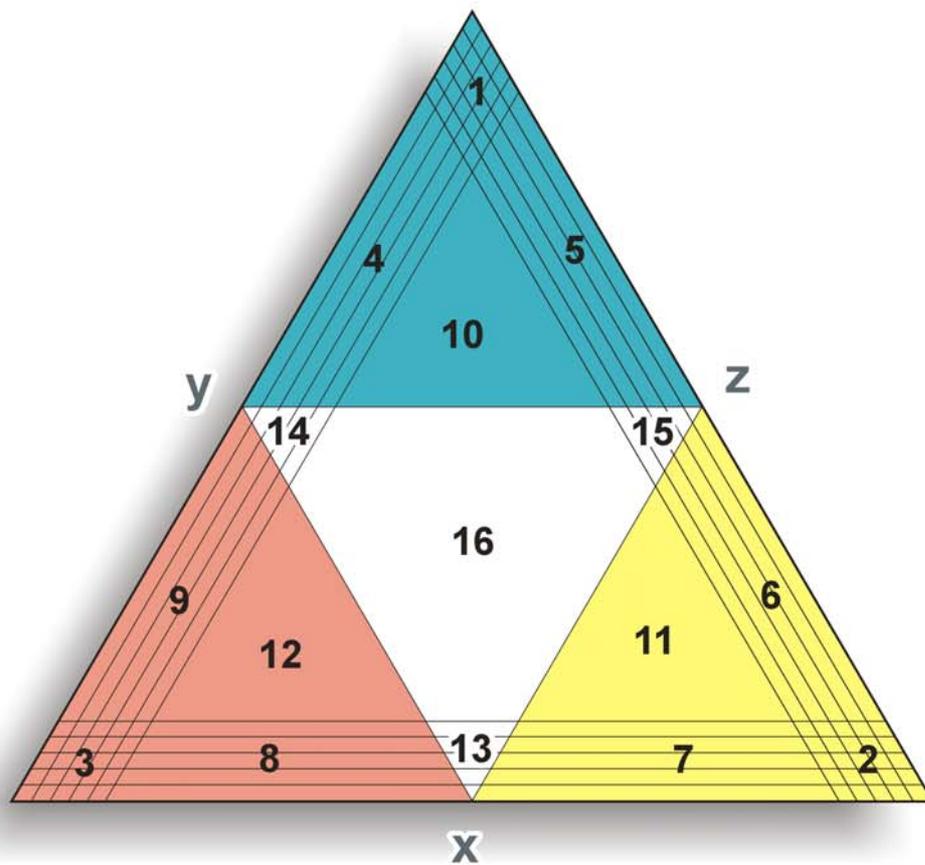
Table 1. Average age of data (in years) on the three social indicators

| SUB-SAHARAN AFRICA | | | | | |
|--------------------|-----|----------------------|-----|---------------|------|
| Cameroon | 1.7 | Mauritania | 3.3 | Namibia | 6.0 |
| Kenya | 1.7 | Eritrea | 3.7 | Nigeria | 6.3 |
| Niger | 1.7 | Congo, Dem. Rep. | 4.0 | South Africa | 6.3 |
| Mozambique | 2.0 | Gambia | 4.0 | Ethiopia | 6.7 |
| Togo | 2.0 | Uganda | 4.0 | Lesotho | 6.7 |
| Mauritius | 2.3 | Central African Rep. | 4.3 | Liberia | 10.0 |
| Zimbabwe | 2.3 | Malawi | 4.3 | Gabon | 10.3 |
| Chad | 2.7 | Rwanda | 4.3 | Angola | 11.0 |
| Madagascar | 2.7 | Botswana | 5.0 | Guinea-Bissau | 11.0 |
| Senegal | 3.0 | Ivory Coast | 5.0 | Sierra Leone | 13.0 |
| Tanzania | 3.0 | Burkina Faso | 5.3 | Congo | 14.0 |
| Zambia | 3.0 | Guinea | 5.3 | Somalia | 14.7 |
| Benin | 3.3 | Burundi | 5.7 | | |
| Mali | 3.3 | Ghana | 5.7 | | |

Besides of the mentioned above problem of the readable presentation of distribution within two-component population a yet more different task is mapping of demographic structure of regions being subject to the influence of two different, extremely situated spheres of activity: in political orientations, cultures, languages, religions or behavioural field. The most characteristic is the case of three-componental society with two minorities.

In contrast to the thematic maps of a more multifunctional nature individual statistical maps usually have a more limited purpose and a narrow group of users. Therefore more concrete rules of map design and construction have to be determined.

In Figure 2 the very simple example of purposely steered division of the Ossan triangle that allows to construct a choropleth map distinctive showing the diversification of a structure has been presented. It can be noticed that majority of proposed divisions of Ossan triangle [10] for presenting socio-economical issues leads to multi-coloured and not always consequently built designations, moreover, along with too complicated for users rule of decoding value of thematic scale. In the presented on the Figure 2 solution (besides white) only three-coloured diversification of designations has been used but enforced by pattern composed of consequently directed lining, 16 different types of structure should be distinguished. The list of possible cases for fixed as 10% level of minority, are specified in the Figure 2. Analogical solution may be applied for each determined level of the percentage share. On the Figure 3 the practical usage of the first system of designations but for the 5% versions is shown. The minorities (x – white, y – black, z – Hispanic and other) between 5% and 10% are distinguished using spaced lines.



| No | design- nation | type | domi- nation over 80% | supremacy over | | minority under 10% | between | | | additional condition |
|----|-------------------|--------------|-----------------------------|-------------------|-------------|--------------------------|------------|------------|------------|-------------------------|
| | | | | a 50% | b 50-80% | | 10-40 % | 40-50 % | 10-50 % | |
| 1 | | A (1d+2m) | x | - | - | y, z | - | - | - | - |
| 2 | | | y | - | - | x, z | - | - | - | - |
| 3 | | | z | - | - | x, y | - | - | - | - |
| 4 | | B (1s+1m) | - | x | - | y | - | - | z | - |
| 5 | | | - | x | - | z | - | - | y | - |
| 6 | | | - | y | - | z | - | - | x | - |
| 7 | | | - | y | - | x | - | - | z | - |
| 8 | | | - | z | - | x | - | - | y | - |
| 9 | | - | z | - | y | - | - | x | - | |
| 10 | | C (1s) | - | - | x | - | y, z | - | - | y+z<50% |
| 11 | | | - | - | y | - | x, z | - | - | x+z<50% |
| 12 | | | - | - | z | - | x, y | - | - | x+y<50% |
| 13 | | D (1m) | - | - | - | x | - | y, z | - | - |
| 14 | | | - | - | - | y | - | x, z | - | - |
| 15 | | | - | - | - | z | - | x, y | - | - |
| 16 | | E | - | - | - | - | - | - | x,y,z | x+y+z<70% |

Figure 2. Proposal of the graphical means for presentation of the 16 kinds of three-componental structures of society (certain 10% for minority)

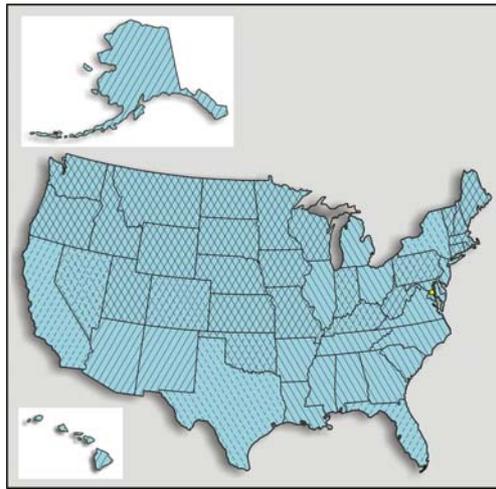


Figure 3. The racial structure of the subpopulation of US composed from the blinds, age 40 and older by state

As a very important case near by equalised three-component division of population may be considered. Suitable solution determines only 9 types of structure that have been shown on the Figure 4. Such a situation is characteristic more often for such regions where political, economical or cultural transformations are not very fresh and society is living more stable than in the case of expressive conflict within the society rapidly transformed. Tilly called this state an adaptation of the next temporal stage after emulation [2].

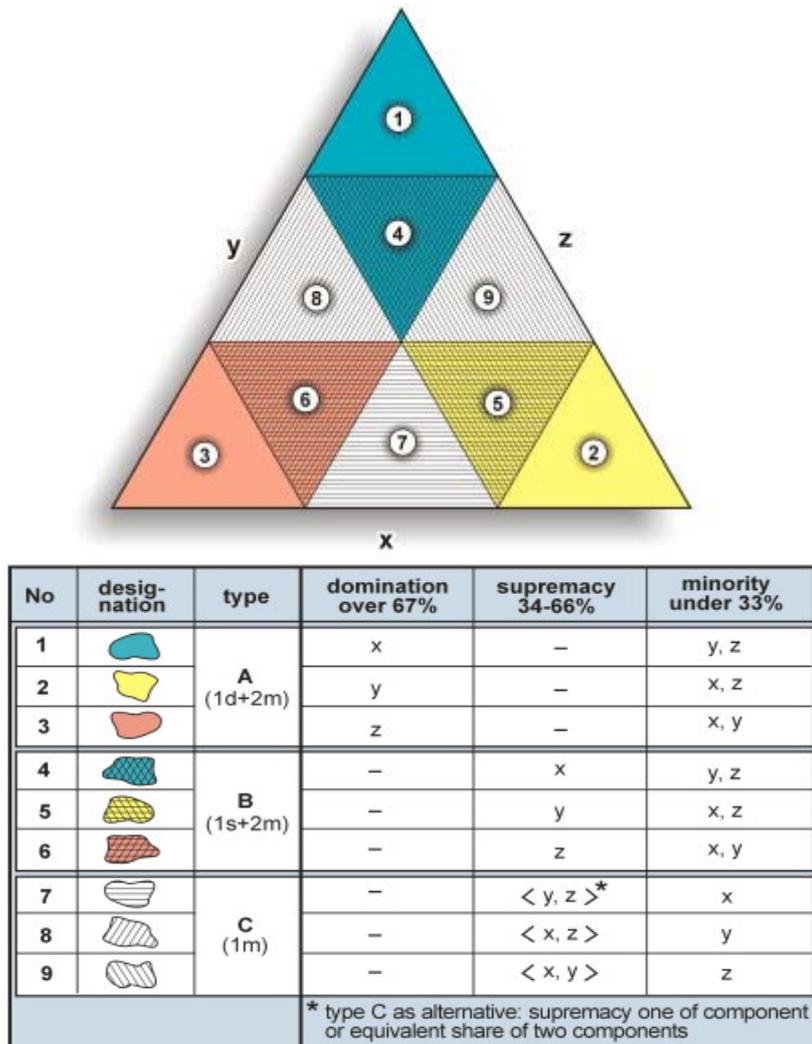


Figure 4. Proposal of the graphic means for presentation of the 9 kinds of three-component structures of society (criterion 0,33% for minority)

6. SUMMARY

Besides of the mentioned in the paper problems connected with lack of actual data and a very specific spatial distribution of features and characteristics which have to be presented in the projected ICA Demographic Atlas the proper choice of projections should be carefully solved. The atlas is an excellent occasion to introduce to the cartographic practice a new kind of designations, usable form of methodological modifications and proper choice of type of reference units – for further convenience of the map as an easy readable mean of communication.

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Biography

Prof. Dr. Ewa Krzywicka–Blum holds a Diploma of Mathematics from the University of Wrocław and MSc in Geodesy from the AGH University of Science and Technology in Cracow, and a PhD in Geodesy from Agricultural University of Wrocław collaborating with professors: Hugo Steinhaus and Jan Mikusiński in the field of mathematical analysis. Then she decided to continue her research interests in the field of application of mathematics method in cartography and geodesy.

She started to work in the Agricultural University of Wrocław as an assistant in the Department of Higher Geodesy. Current she is Head of the Department of Geodesy and Photogrammetry, Agricultural University of Wrocław. Several years ago (1988–1996) she was also a professor of cartography in the University of Wrocław, Institute of Geography.

Prof. Ewa Krzywicka–Blum is a member of Committee of Geodesy (Polish Academy of Sciences), Wrocław Scientific Society, National Committee of ICA. She headed the ICA Commission on Gender in Cartography. She is author of 135 published works and co–owner of the patent connected with the sonorical method of mapping.