CARTOGRAPHY IN THE FACE OF CONTEMPORARY SOCIAL PROBLEMS

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1. INTRODUCTION

The development of cartography till the end of eighteenth century followed the development of mathematics and other areas of scientific activity being in interest of contemporary societies. The comprehensible language of a map corresponded to limited list of practical needs connected with traveling and reign over a nation or – management a state in given territory. Of course up to day both maps' functions: guiding and facilitation of recognition of given whole's have been preserved. The period of the Great Geographical Discoveries as well as significant Newton's works was the origin of new approach to the technics of observation and – to the importance of high precision of measuring. The requirement of accordance all results, without any exception, with supposed laws of nature caused elimination or even "correction" unruly data. Such cases have been proved using actual statistic method relating to Newton and later Milliken and were justified till the time when uncertainty and ambiguity became the basic elements of scientific analysis Since the end of eighteenth century, owing spreading different more precise instruments and new methods of observations scientists had to their disposal rich collections of data that should be ordered and assessed. As the first classification the division of all alive organisms had to be recognized although, as it later became evident, applied by Linneus key of division didn't fully satisfied. In nineteenth century just precision became the specially important value of theoretical as well as experimental works. The science has to be branched because of differences between methods and language of description. Each of several particular disciplines has to define its basic notions, features, characteristics as well as specific rules and kinds of methodology suitable to the main subject of interest.

Cartography answered to such a situation introducing to the traditional means of coding of real arrangement of objects also designations representing different abstract characteristics. Apart of new type of isolines the language of a map has enriched by introducing the diagrams and choropleth designations related to the mosaic composed from given system of unit areas. It was crucial for successful inclusion cartography to the group of general scientific disciplines because new methods allowed to present spatial distribution of different kind of real and abstract features as the synthetic pictorial model which make possible holistic observation of spatial relations between components of various studied wholes.

Unfortunately, very long period of using maps elaborated in natural, easy comprehensible code of geometrical designations caused that new cartographic language throughout over fifty years was a barrier against acceptation the range of cartography. Two scales: one reffered to the traditionally coded background and the second one related to the thematic map's content required suitable education of map users, as well as research workers from other than cartography branches. It is like situation of statistics – only for educated persons using statistical methods may be the key to correctness in deduction.

2. SOCIO - DEMOGRAPHY, CHALLENGE FOR MODERN CARTOGRAPHY

After the Second World-War one of the central problems to be solve by different organizations and bodies gathering scientists, politics and economists was care about steering sustainable development of global environment. Of course - including human component This time uncontrollable growth of population living in technologically backward countries and, as a consequence, scale of differences between level of human life in different parts of the globe turns attention of international organizations towards social problems. Also scientists very intensively started to enlarge the domain of researches related to important processes within societies after systems' transformation. New discipline: socio-demography as the main subject of interests indicates relation between groups of people and studies over particular groups. The definition of groups is being in progress, new groups are being contributed accordingly to the actual situation in economy or politics. It can be observed that as in each discipline *'in status nascendi'* new 'features' are defined most often in very simple way, for instance 'cohort' means 'the group of people born in the same day', so only one attribute determines the group being the subject of scientific observation. Likely – definition of quantitative characteristics is limited to ratio, percentage, range of variability, average, more complex one are being used very rarely. Such a situation has being reflected in contemporary state of socio-demographic maps. In atlases, among maps of this part, one can see the pyramide of age and several cartograms and cartodiagrams presenting 'feminization', 'segregation degree' or 'ratio of illiterates' etc.

To justify cartographic inactivity only sufficient formalized language of socio-demography seems not sensible. Force of contemporary science lays in infiltration experiences of many special fields, applying various methods, using diversity of communication means. Even traditional cartographical system of coding should be availed in studies of processes, composed features, characteristics changes of structures. Cartographers have to propose modeling of suitably transformed data, introducing defined indexes and adding textual commentary. Of course lack of standardized and time harmonized data may be the barrier to elaborate reliable model.

Comparing two authors' map [Bac-Bronowicz et al, ,2006] presenting population of people of higher education in the Middle East (2004) we can recognize difference of type of information. The first cartogram shows percentage of educated women in total population, the second- gender structure within sub-population of high-educated. In the second case cartographer has to define the indicator of structure's imbalance.

As an interesting example of usability maps in studies of demographic processes mey be indicated the work devoted to change of gender - structure within European population aged over 60 years between 2000 and 2005 year [Jarząbek, 2005]. Increase of women predominance {+}, decrease (-) or state without a change (o) has been observed within four separated age groups: 60-64, 65-69,70-74, 75 and more. The type (- - - +) has been distinguished as dominant. Twelve from forty six countries (among which: France, Italy, Belgium, Poland, Spain) have included to this group. The structure (+ - - -) represented :Austria, Netherlands, Denmark, Norwey, Sweden and United Kingdom, very interesting type: (- + + +) characterizes three countries: Bulgaria, Macedonia and Romania. Only in Switzerland the structure (- - - O) is represented. The influence of differences between official "age of working" and level of social care are evident.

Using as the feature differences of values related to two observed points of time-scale it is possible to present a level of reduction for instance illiteracy or unemployment. Having in disposal two lists of differences related to successive periods cartographer may to elaborated a model of dynamics of reduction. Such example has been proposed

in the study devoted to illiterate of women in the world between 1970 and 2000 year [Ługowska, 2005].

Apart of proposals of introducing on the traditional map purposely transformed socio-demographical data cartographers should more decidedly recommend using new type of quantitative models: anamorphoses. Such a model is being unscrupulously presented by journalists to expose the results of election or to present prediction of global population. Each of reference areas is proportional to the number of voices or number of people in this administrative units. New type of a map where the system of unit areas creates a background in the same scale than a main thematic element expressed by an area of diagram (circle, square or a figure having the same shape than reference area) is an excellent model to visual studies of relation for instance between a number of unemployed and a number of people in 'working age' or between a number of pupils and a number of children 'in school age' [Krzywicka-Blum, 2001 and 2003].

3. 'PRESERVATION OF HUMAN RIGHTS' AS A MAP CONTENTS

For mapping, the very often used notion 'human rights preservation', up to now is not sufficiently defined. It can be recognized many projects, publications, scientific studies devoted to human rights but, dependently on different point of view, the same terms have not the same meaning. As in each case of projecting a map which have to reveal significant spatial properties of very complex feature (such as climate) or notion (such as 'cultural landscape') it is necessary to dispose the knowledge related to hierarchy between important components of main element of given map' contents. Cartographer should have to his disposal the list of hierarchically ordered components and collection of time harmonized and space representative data. In case of the map of 'human rights preservation' in global scale neither of these conditions can be actually fulfilled. Firstly – the components which are taken into consideration in works and analyses of the problem don't create the homogeneous, relatively independent and complete system. Such attribute as 'age of education' or 'family status' are defined dependently on cultural system on given territory. Secondly the censuses up to now are not fully time harmonized.

In the paper prepared for XXII ICC of the International Cartographical Association (A Coruna, 2005) the list of fifteen features (attributes representing considered groups of people) chosen by the national censuses have been presented [Krzywicka-Blum, 2005]. Each of them determine the internal division into several components dependently on influence on nine distinguished spheres of human rights. The system of evaluation of supporting or blocking influence have been proposed as a result of many studies and discussions in the frame of the ICA's Commission on Gender and Cartography.

For general analysis, proposed in this paper, the internal division of features has been aggregated to binary form, the nine sphere of human rights have been considered into three comparable sections, and the weights have been normalized. The listed features are:

1. GENDER (women, men),
2. AGE (non working age, working age),
3. MARITAL STATUS (single, married),
4. CITIZENSHIP (of given country, other),
5. SOURCE OF INCOME (work, rent, pension; on the maintenance),
6. HEALTH STATUS. (non disabled, disabled),
7. LITERACY (literate, illiterate),
8. EDUCATION (primary, secondary and higher),

9. PROFESSION (with profession, without profession),
10. COUNTRY OF BIRTH (of census, other),
11. PLACE OF RESIDENCE ONE YEAR BEFORE CENSUS (of census, other),
12. PLACE OF RESIDENCE (in the same country, abroad),
13. NATIONALITY/RACE (of the majority, other),
14. USED LANGUAGE (of the majority, other),
15. WORSHIP (without restrictions, with restrictions).

The groups of conditions of human rights protection are related to:

1. EXISTENTIAL CONDITIONS (1. Access to the medical help, 2. Birthright, 3. Ensuring the family existential needs),
2. LABOUR CONDITIONS (1. Access to work, 2. Condition of promotion and senior position, 3.Earning),
3. EDUCATIONAL AND SOCIO_CULTURAL NEEDS (1. Access to education, 2. Social and political needs, 3. Cultural needs).

The table 1 presents results of evaluation of absolute differences of positive force (supporting influence) between subpopulations within each of features when the table 2 – relatively – values of negative force (blocking influence).
Comparing the mean values of level of influence within the features it can be observed that extreme (positive and negative) differences are:-0,24 (feature 14) and +24 (feature 3). Dividing the scale of changes into six ranges +3,+2,+1,-!,-2,-3 it can be noticed that features: 3, 4 and 9 (marital status, citizenship, profession) may be treated as 'strongly supporting', features: 1, 12 (gender, place of residence) - 'middle supporting' and features: 2, 5, 13 (age, source of income, nationality/race)-'weakly supporting'. Respectively features: 14 (used language) has be included to the 'strongly blocking' when features: 6, 11, 15 (health status, former residence, worship) – 'middle blocking'. Two features: 8 and 10 (education, country of birth) are the features of equal influence: first on the level of force: 0,32 and the second one 0,11.
Taxonomical analysis of differences between levels of influence allows to separate the groups of similar force (on the level of similarity 1- d = 0,8) of positive influence as well as of negative one.

Force	Supporting	Blocking
I. strong	A. 4:12 B. 1 0,56	A. 14: 6,7 B. 12: 4 0,41 C. 1 D. 8
II. medium	A. 9: 3,6,8 B. 7: 13 0,31	A. 13: 2,5,11,15 0,20
III. weak	A. 5 :10 B. 14: 11,15 0,12	A. 3 : 9,10 0,12

It can be observed that features: 6, 7 (health status, literacy) have prevalent blocking influence (-IA) over supporting (+IIA, IIB), also 11, 15 (former residence, worship) - (-IIA) relatively to (+IIIB), when feature 3 (marital status) has prevalent supporting (+IIA) over blocking (-IIIA) influence.

Taxonomical analysis may be a key to optimal choice of features representative for studies connected with inequalities between subpopulations living in the same territory. Differences of influence force make possible to choice the proper cartographic means to organize differently perceived layers of map' contents. It is evident that in studies of blocking or supporting preservation of human rights just the features of the strong influence may have priority as these ones determining basic social divisions.

Table 1
Differences between the weights of supporting force within two subpopulations according to distinguished features (attributes) determining the division of society

	S	E	C	T	I	O	N	S			
	Existential			Labour			Educational socio-cultural				
No	1	2	3	1	2	3	1	2	3	dw	No
1.	0.667	1.000	0.000	0.667	0.667	0.667	0.500	0.500	0.166	0.54	1
2.	0.167	0.208	0.251	0.500	0.333	0.333	0.167	0.500	0.417	0.32	2.
3.	0.667	0.000	0.667	0.166	0.667	0.000	0.000	0.667	0.500	0.37	3.
4.	1.000	0.000	1.000	0.500	0.500	0.000	0.833	0.667	0.500	0.56	4.
5.	0.333	0.000	0.445	0.027	0.000	0.000	0.111	0.667	0.000	0.18	5.
6.	0.667	0.000	0.667	0.500	0.000	0.167	0.500	0.000	0.000	0.28	6.
7.	0.000	0.000	0.000	0.667	0.000	0.000	0.500	1.000	0.667	0.32	7.
8.	0.000	0.000	0.500	0.500	0.417	0.333	0.500	0.333	0.333	0.32	8.
9.	0.667	0.000	0.667	0.500	0.166	0.166	0.166	0.333	0.333	0.33	9.
10.	0.000	0.000	0.000	0.000	0.000	0.000	0.166	0.667	0.166	0.11	10.
11.	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.000	0.167	0.09	11.
12.	0.867	0.000	0.534	0.567	0.534	0.534	0.833	0.534	0.567	0.55	12.
13.	0.000	(0.167)	0.000	0.500	0.166	0.000	0.600	0.500	0.500	0.25	13.
14.	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.667	0.13	14.
15.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.07	15.

TAXONOMICAL DISTANCES {d} BETWEEN SUPPORTING FORCES														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	.000	.329	.426	.463	.497	.407	.444	.361	.389	.463	.482	.319	.382	.519	.574
2.	.329	.000	.282	.356	.261	.319	.282	.144	.190	.246	.338	.279	.182	.245	.301
3.	.436	.282	.000	.222	.164	.315	.389	.306	.185	.296	.426	.270	.326	.352	.333
4.	.463	.356	.222	.000	.380	.315	.389	.306	.259	.444	.462	.159	.304	.463	.519
5.	.497	.261	.164	.380	.000	.250	.312	.296	.268	.114	.244	.406	.286	.300	.250
6.	.407	.319	.315	.315	.250	.000	.370	.231	.130	.352	.259	.304	.307	.296	.352
7.	.444	.282	.389	.389	.312	.370	.000	.268	.352	.204	.259	.385	.122	.185	.240
8.	.361	.144	.306	.306	.296	.231	.268	.000	.176	.287	.268	.228	.169	.269	.324
9.	.389	.190	.185	.259	.268	.130	.352	.176	.000	.296	.352	.130	.252	.278	.333
10.	.463	.246	.296	.444	.114	.352	.204	.287	.296	.000	.130	.471	.178	.204	.148
11.	.482	.338	.426	.462	.244	.259	.259	.268	.352	.130	.000	.460	.174	.185	.130
12.	.319	.279	.270	.159	.406	.304	.385	.228	.130	.471	.460	.000	.300	.445	.500
13.	.382	.182	.326	.304	.286	.307	.122	.169	.252	.178	.174	.300	.000	.159	.215
14.	.519	.245	.352	.463	.300	.296	.185	.269	.278	.204	.185	.445	.159	.000	.055
15.	.574	.301	.333	.519	.250	.352	.240	.324	.333	.148	.130	.500	.215	.055	.000
mean	.43	.27	.31	.36	.29	.30	.30	.26	.26	.27	.30	.33	.24	.28	.30

Table 2
Differences between the weights of blocking force within two subpopulations
according to distinguished features (attributes) determining the division of society

	S	E	C	T	I	O	N	S			
	Existential			Labour			Educational socio-cultural				
No	1	2	3	1	2	3	1	2	3	dw	No
1.	0.667	1.000	0.000	0.667	o.667	0.667	0.500	0.500	0.166	0.54	1
2.	0.167	0.208	0.251	0.500	0.333	0.333	0.167	0.500	0.417	0.32	2
3.	0.667	0.000	0.667	0.166	0.667	0.000	0.000	0.667	0.500	0.37	3
4.	1.000	0.000	1.000	0.500	0.500	0.000	0.833	0.667	0.500	0.56	4
5.	0.333	0.000	0.445	0.027	0.000	0.000	0.111	0.667	0.000	0.18	5
6.	0.667	0.000	0.667	0.500	0.000	0.167	0.500	0.000	0.000	0.28	6
7.	0.000	0.000	0.000	0.667	0.000	0.000	0.500	1.000	0.667	0.32	7
8.	0.000	0.000	0.500	0.500	0.417	0.333	0.500	0.333	0.333	0.32	8
9.	0.667	0.000	0.667	0.500	0.166	0.166	0.166	0.333	0.333	0.33	9
10.	0.000	0.000	0.000	0.000	0.000	0.000	0.166	0.667	0.166	0.11	10
11.	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.000	0.167	0.09	11
12.	0.867	0.000	0.534	0.567	0.534	0.534	0.833	0.534	0.567	0.55	12
13.	0.000	(0.167)	0.000	0.500	0.166	0.000	0.600	0.500	0.500	0.25	13
14.	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.667	0.13	14
15.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.07	15

TAXONOMICAL DISTANCES {d} BETWEEN BLOCKING FORCES														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	.000	.329	.426	.463	.497	.407	.444	.361	.389	.463	.482	.319	.382	.519	.574
2.	.329	.000	.282	.000	.262	.222	.444	.380	.241	.222	.259	.374	.204	.333	.370
3.	.407	.185	.000	.240	.170	.278	.352	.324	.148	.055	.093	.359	.111	.240	.240
4.	.463	.240	.240	.000	.293	.333	.407	.250	.278	.259	.259	.193	.204	.296	.370
5.	.442	.262	.170	.293	.000	.312	.386	.377	.146	.201	.238	.323	.145	.275	.127
6.	.351	.222	.278	.333	.312	.000	.222	.306	.259	.296	.296	.408	.241	.111	.333
7.	.278	.444	.352	.407	.386	.222	.000	.250	.352	.371	.370	.422	.315	.185	.333
8.	.268	.380	.330	.250	.377	.306	.250	.000	.287	.306	.324	.321	.287	.250	.380
9.	.296	.241	.148	.278	.146	.259	.352	.287	.000	.129	.204	.345	.073	.240	.204
10.	.389	.222	.055	.259	.201	.296	.371	.306	.129	.000	.074	.378	.129	.259	.259
11.	.426	.259	.093	.259	.238	.296	.370	.324	.204	.074	.000	.311	.129	.185	.185
12.	.508	.374	.359	.193	.323	.408	.422	.321	.345	.378	.311	.000	.300	.304	.274
13.	.296	.204	.111	.204	.145	.241	.315	.287	.073	.129	.129	.300	.000	.204	.166
14.	.315	.333	.240	.296	.275	.111	.185	.250	.240	.259	.185	.304	.204	.000	.222
15.	.389	.370	.240	.370	.127	.333	.333	.380	.204	.259	.185	.274	.166	.222	.000
mean	.37	.40	.25	.29	.26	.28	.33	.31	.23	.24	.24	.34	.19	.24	.28

4. CONCLUSION

Development of disciplines is a process of interrelations between specific methods, means and manners of presenting the scientific results. Relations between socio-demography and cartography may served as an example of many difficulties and real barriers which have to be overcome on the way to rich the next step of science.

To day the possible strategy for cartographers seems be creating several types of maps with intentionally chosen or transformed data and next – convicting people interested in socio-demographical problems (scientists, politics, economists and members of regional as well as global organizations) of effectiveness of deduction about spatial properties – on the base of visually observed model of states, changes or processes.

Methodology proposed in the paper may be applied in analysis separately treated sectors or junction of purposely chosen group of condition of human rights preservation. In each case the list of features should be limited to these having influence on at least one of condition of studied rights.

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