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ONTOLOGICAL VALUE OF GEOGRAPHY

Ontologický význam geografie. — Zemský povrch je kromě atmosféry největší entitou vnější reality (pokud je přímo měřitelná), a proto jeho kvantitativní poměry mají základní význam i pro ontologii. Pozorujeme je v rámci cartesiánských souřadnic biometricky pojatých, jež představují nejobecnější spojení kvantity a kvality. K tomu účelu se hodí však jen individualizované útvary povrchu zemského, tedy např. ostrovy, jezera a povodí řek, pokud jsou o nich statistická data, stejně velmi vzácná a nestejně zpracovaná. Ač pozorujeme jen 10 variačních řad, všechny vykazují statistické rozložení připomínající větev hyperboly. Má tedy tvar zcela jiný než je typická pro řady biometrické. Jevy ekonomické vykazují většinou rozložení stejného typu jako fyzicko-geografické, ale vyskytují se přechody k tvaru biometrickému, jenž představuje stejnost biologického druhu. Naproti tomu variace hyperbolická je obrazem rozmanitosti a představuje nejabstraktnější vyjádření spojených protikladů ve smyslu kvantitativním.

1) Besides the atmosphere the earth's surface is by far the largest entity of outer reality as far as it can be observed and measured direct. The synthetic science of the earth's surface should therefore, more than other sciences, contribute to the ontological conception. The latter task of geography is, however, unusually difficult as the earth's surface simultaneously represents also a maximum in the qualitative point of view, it is the largest universe of all possible varieties (diversities). It is true that the atmosphere is vaster as to quantity but as to quality, infinitely poorer, as far as one has in mind relatively stable structures. In the latter sense the Sun itself is qualitatively poorer than the Earth despite his huge volume.

Considering the significant and exclusive position of the earth's surface in the world of outer reality, we will attempt, in a summary manner, at least to draw the quantitative structure of this largest known universe of varieties as far as the most simple attributes are concerned.

The biometric method (Fr. Galton, 1883) suits our task best as it attains the most general connection of the quantity category and the quality category by means of Cartesian coordinates. That is why we presume that by using this extremely abstract tool it is necessary to measure also the whole lifeless world as even within it individualized features occur. According to the nature or this subject we have to modify a little the usual conception of statistical variation and replace also the term "biometrics" with the term "variation statistics".

The statistical measuring of the earth's surface introduced A. Humboldt 1842, his geometrical conception improved K. Kořistka 1854. Following their ideas, A. Cochon-Lapparent, 1883, had construed the so called hypsometric curve which then became a generally acknowledged instrument of scientific geography. The hypsometric curve is in substance based on variation statistics, even if not stemming from the number of units, that is, individualized features.

It is, of course, true that on the earth's surface there are only few phenomena that could be considered as individualized features Islands and lakes seem as such at the first sight. But already here we face another difficulty: neither the most simple property, that is, the size, has not been measured with all units but on the territory of several countries. Another difficulty consists in the fact that the official statistics contain the latter data compiled more from the practical than the theoretical point of view. That is why frequency series have been compiled rather according to frequency than to the variation span. From the theoretical point of view, however, we should respect the values placed on axis x in the same way as the values y. That means that the length of intervals placed on axis x should be determined according to the whole variation span. This is not usually carried out with geographical series. That is why we are referred to data that do not fully suit our purpose.

2) As far as the islands are concerned, the most suitable data come from Greece, less suitable from Yougoslavia, Denmark, and two German states. As a fourth example we choose the Philippine Islands, even if their data have been gathered into only four degrees of area: they, however, represent a very extensive and natural complex of islands relatively well measured. The data have been taken from the official statistical reports so that the degrees of areas (intervals) are not equally large. That is why we cite, besides the original frequency series f, another series f_1 the values of which have been reduced (by simple arithmetical mean) to equally large intervals. The data are also not comparable because one does not know anywhere the lower limits of the minimum (0,1 hectare in Greece), and that every series comprises another number of intervals. So that we may evaluate the areas in their relation to the whole variation span, we cite in the heading of every group of islands not only the total number of units but also the area of the largest unit, the regional maximum.

a) Greece: 787 islands (larger than 0,1 hectare), maximum 8379 km^2;

Area:	under 3 —	10 —	25 —	50 —	100 —	200 and more km^2
f . . .	683	34	23	11	10	10	16
f_1 . . .	683	14,6	4,6	1,3	0,0	0,0	0,0

b) Yougoslavia: 914 islands, maximum 408 km²;

Area: under 1	— 2	— 5	— 20	— 100 and more km²	
f ... 848	9	20	20	11	6
f_1 ... 848	9	6,6	1,3	0,1	0,02

c) The two German states and Dennmark: 550 islands, maximum 7016 km²;

Area: under 2	— 5	— 10	— 25	— 50	— 100	— 200 and more km²	
f ... 464	23	19	17	4	7	2	14
f_1 ... 464	15,3	7,6	2,3	0,4	—	—	—

d) The Philippine Islands: 7083 islands, maximum 40,814 square miles;

Area: under 1	— 1000	— 10,000 and more square-miles	
f ... 6621	451	9	2
f_1 ... 6621	0,5	0,0	0,0

All these four groups of islands have been selected at random, and are relatively small except the Philippine Islands. The area has been observed according to different degrees of size; it is however important that, as far as the size of the smallest degree is concerned, the differences are quite small, they fluctuate between 1 and 3 km². The greatest differences are however in the maximum, the size fluctuates between 7016 km² (Själland) and 104,600 km² (Luzon); the Yougoslav islands are considered here together with the Greek ones. From the point of regional maximum the Philippine row is therefore the most detailed one as the lowest degree represents 1 : 40,000 variation span while with Greece 1 : 2793. We can see that as far as these geographical series are concerned, we cannot follow the biometric principle in that the number of degrees should not exceed 25.

Despite the above-mentioned discrepancies the result worked out for all four groups of islands is the same substantially. The statistical distribution of their areas is extremely asymmetrical, the relative frequency being 85, 91, 84, 94 per cent in the lowest degree. When in a graph, it shows a shape suggesting a hyperbola branch.

3) If we consider the islands as positive creations of the earth's crust in the vertical sense, then the l a k e s are negative creations of it. We shall not be surprised then that the statistical distribution of the lakes areas will be of a similar type as we have found with island. The most suitable data relate to the Latvian SSR: they include 2980 units of an area larger than 1 hectare with the maximum of 110 km² (Lubana).

Area: under 0,5	— 1,0	— 2,5	— 5,0	— 10 and more km²	
f ... 2713	133	73	32	14	15
f_1 ... 2713	133	24	6	1,4	0,0

An exceptionaly large frequency in the first degree is, no doubt, connected with the fact that a "young" glaciated plain is concerning. As an example of an older configuration, an analogous series in Yougoslavia is cited here as follows; 220 units with the maximum of 335 km².

Area: under 0,5 —	1 —	2 —	5 —	20 and more km²	
f ... 157	30	7	13	7	6
f_1 ... 157	30	3,5	2,2	0,2	0,0

The above-mentioned two series are further completed with another example relating to the area of ponds in Czechoslovakia. Though the ponds were mostly artificially created through economic activities, their area is after all determined by the shape of the terrain similarly as with the lakes; there are 16,136 units, the maximum 490 hectares;

Area: under 5 —	10 —	50 —	100 and more hectares	
f ... 8528	970	1984	998	3756
f_1 ... 8528	970	235	100	47

Also the above-mentioned examples that have been selected at random and not uniformly measured, result in an extremely asymmetrical statistical distribution. With the exception of Latvia the relative frequencies of the first degree are however no so high as with the islands; this is in connection with the fact that the length of this degree is in the relation to the maximum much larger than in the case of islands.

4) The river basins are an important example of an individualized unit of the earth's surface. They are units of a rather dynamic nature, for certain activities ocurring in them concentrate to the common axis. The river basins, differentiated from the point of only one and absolute recipient, that is, sea, are considered here as a comparable unit. The data, thus elaborated, which would simultaneously comprise the whole natural area, are available in rather a detailed compilation in Sicily; we have not succeed in getting the analogous data from Great Britain.

Neither the data from Sicily have not been elaborated enough. Only 63 of the total number of 326 river basins are cited as independent units; other smaller river basins have been gathered together to 56 wholes according to geographical coherence: it was therefore necessary to differentiate them according to the 1 : 500,000 map and measure roughly. The results have been arranged in 7 degree series the lowest degree of which represents 1 : 85 variation span with the maximum 4186 km² (Simeto).

Area: under 50 —	100 —	200 —	300 —	400 —	500 and more km²	
f ... 266	18	17	8	6	4	7
f_1 ... 266	18	8,5	4	3	2	0,1

Also this statistical distribution is extremely asymmetrical. It may be supposed that such a distribution can be found even elsewhere as the number of rivulets along the coast zone is probaby many times larger than the number of large rivers inland. The presupposition can be backed by statistical data on the length of rivers as the area of river basins depends on their length to a large extent. Full statistical data have come only from Yougoslavia. They include

1728 rivers longer than 10 km as far as they flow through the state territory entirely; maximum 940 km (Sáva).

Length:	10 — 25	— 50	— 100	— 250	— 500	and more km
f ...	1327	290	76	29	5	1
f_1 ...	1327	174	22,8	2,9	0,3	0,0

5) Altitude differences are the basic properties of earth's surface. The gross variation series can easily be derived from hypsometric curve even if it is not based on individualized features; let us cite the data applied by J. Staszewski in 1957, only, do we reduce frequency to the same length x.

Altitude:	under 200	— 500	— 1000	— 1500	— 2000	and more m
f_1	27,8	19,7	8,5	3,9	2,6	0,2

In view of maximum 8800 m, the degree of 200 m agrees with 1/44 of the variation width. According to H. Wagner—Kossina's 1922 paper, 32,8% result for the first degree delimited in the same manner.

The statistical distribution of solid earth's surface is also of an extremely asymmetrical shape, but the lowest degree is not so dominant as in the preceding geographical series. The explanation may be found in the fact that the main features of the continental relief had been created much earlier than smaller configuration manifested by the surface of isles and lakes. During further development the altitude differences successively get reduced while the mode decreases.

6) On the basis of the above-mentioned series we presume that the size of physico-geographical units is of a statistical distribution which is extremely asymmetrical. The latter opinion is extraordinarily supported by the fact that one of the most important properties of the earth's surface, its h u m i d i t y, is of a similar statistical structure. The data, of course, refer only to the total annual amount of precipitations, and have not been elaborated according to natural units but only according to 7 zones demarcated by isohyets. The data were thus published by W. D. Jones and D. S. Whitlessey, 1925, in their textbook on economic geography. They include the whole continent without Antarctis being roughly graduated by 50 cm. In respect of the maximum in Assám 1100 cm (which has been observed longer than Hawai), one degree agrees with 1/20 of the variation span.

Rainfall:	under 50,8	— 101,6	— 152,4	— 203,2	— 304,8	and more cm
f (per cent)	55	20	11	9	4	1

The first degree frequency would increase to 59,3 while decreasing to 18,1 in the second degree if Antarctis were taken into consideration. This statistical distribution of humidity is so much more remarkable that such an important characteristics of the earth's surface as temperature represents, is probably of quite a different statistical distribution. Though analogous data are not available, we can see it from extreme values —35 + 30° C. Partly, the variation is unusually narrow here when compared with humidity, partly, in view of the division into 20 classes the first degree frequency will be considerably smaller than 10 per cent. On the other hand, the warm areas (A and B as Köppen has it) cover nearly 50 per cent of the land.

One shoud appreciate the substantial difference between the two phenomena. While humidity is an exclusive product of the earth's surface, the temperature stems in an inappreciable part of the radiation the source of which is 150 million km distant. So much more we are inclined to the hypothesis that it is the "hyperbolic" statistical distribution that agrees with natural conditions on the earth's surface. We cannot however consider this as a strict law as the so called Quetelet law was in a time misunderstood. The hyperbolic form expresses rather a picture of youth which change during development even under the inorganic conditions: both the variation span and the volume of mode are getting smaller during the development.

On the other hand, the units of the organic world are characterized by a narrow variation and the statistical distribution more or less symmetrical, and the Laplace—Gauss curve may be its ideal picture. Biometrics offers a countless amount of evidence relating to it. In the variation of this type we see evidence on relative equality of organic species while in the variation of the hyperbolic type, extreme diversity of the earth's surface. We subjoin that the hyperbolic variation is the most abstract expression of united contradictions.

7) We have so far observed only the physico-geographic phenomena but, on the earth's surface, there are also striking phenomena stemming in economic activities. Even if the delimitation of geographical units is rather difficult here, we can neglect respective discrepancies as the variation classes are relatively broad. The economic-geographical units are generally known to possess a statistical distribution which is extremely asymmetrical with the mode in the minimum. Usual statistical data on the size of towns and settlements at all, on the size of agricultural holdings, of mining or manufacturing units or of industrial centres, can prove it. That is generally known, and we cannot cite the series in this short paper. Also the most important economic characteristics, the distribution of incomes is of such an extremely asymmetrical form in its elemental conditions, and many textbook on statisticss brings documents relating to it.

But in spite of this we cannot state that the economic-geographical units would be characterized by the same statistical distribution as the physico-geographical units. And this is simply not possible as economic-geographical processes are much faster than the physico-geographical processes.

We have so far observed only the size in its absolute value. Some of properties of economic-geographical units are being expressed by relative numbers while the structure of such rates influences the form of the statistical distribution.. It usually is of a hyperbolic form if the denominator contains a non specified part of the earth's surface as, for instance, the whole area of a district. In case both the numerator and denominator contain the number of inhabitants, the variation gets narrower, and its form becomes more or less symetrical. With the latter problems we will deal in a special paper.

Most economic-geographical statistical data concern capitalist conditions. The capitalist system to the maximum make use of diversities of the earth's surface as well as the regional unequality of the economic development. Efforts to attain the maximum of production effectiveness and its excessive concentrationon places most suitable geographically, results in a statistical distribution which is extremely asymmetrical. The socialist policy, however, attemps to balance regional economic differences, and, as far as the most important economic characteristics, the distribution of incomes, is concerned, the statistical distribution probably is rather near to the biometric form. But also in capitalist conditions one can learn that not only too small units but also too large area concentrations are not to advantage from the point of economy. That means, that even here the variation gets narrower and the mode decreases.

The main result of our research is in the thesis, that the statistical distribution of physico-geographical units is of a hyperbolic form which is, however, not always typical for the economic-geographical units. In the latter case one can see transition to a symmetrical biometric form, that is, in economic conditions the human equality prevails more and more.

We have observed very simple but fundamental properties. To evaluate them we have used one of the most general instruments of science. If the geographers expand such a research to many different properties and many countries, then they will enrich the empiric basis of the ontological knowledge of the world.

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