

THE CONTRIBUTION OF PHYSICAL ANTHROPOLOGY/ HUMAN POPULATION GENETICS TO POPULATION BIOLOGY

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This paper is a bibliostatistical one. The motivation for it was provided by a Conference of German Physical Anthropologists on Population Biology. Population biology is, as Baker (1980) pointed out, a multidisciplinary field; however, biological anthropology and human population genetics, which in my opinion are the same as far as normal biological variables are considered, contribute to it significantly. My question was: are there differences between the population biological papers of biological anthropologist/human population genetist and those published by the representatives of other sciences?

To answer this question, I took 23 physical anthropological and human genetical periodicals as samples of the literature. The volumes of ten years —1971-1970— were considered. Only population biological papers were further analysed; and population biology has been defined for this study as a field of physical anthropology/human population genetics according to the definition that the subject of biological anthropology is the variability of normal biological characters in the hominids (Jüergens *et al.* 1975; s. Spiegel-Rösing and Schwidetzky, 1982).

Thus the papers of biological anthropologists and those of representatives of other sciences had to be distinguished.

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Where was no other possibility besides defining the position of the authors by de institutions from which the paper was published. As biological-anthropological institutions were considered:

1. All institutes or departments which have "Anthropology" in their denomination, even if it is obviously the Anglo Saxon collective anthropology comprising also cultural and social anthropology, archeology and so on, and if other sciences are added (*e.g.* Department of Anthropology and Sociology).
2. All institutions which mention population genetics in their name if the head of the department is a human biologist (*e.g.* Department of Demography and Population Genetics in Houston).
3. All institutions and departments of human biology as far as the heads are physical anthropologists or human population geneticists (*e.g.* Department of Human Biology, Canberra).

Of course there is no precise limit between the two groups: the physical anthropologists/human biologists — referred to the following as A-Group — and the rest of the authors, called in the following Non-A-Group; *e.g.* there are some departments of genetics which published predominantly human biological papers which, however, had to be put to the non-A-group (authors with background in anthropology, etc.) Should we find differences between the population biological contributions of the A- and the non -A-group this means only a certain direction of differences, not in its absolute size. Indeed if, for instance, some genetical departments which do predominantly human population genetics are into the A-group, the over-all differences between A- and non - A increase.

At first let me give some general figures. Among 8620 biological anthropological papers — according to the definition given above — 1472 are population-biological ones = 17,1%.

The percentage is higher in the physical anthropological periodicals — 18,8% — than in the human genetical ones (15%).

Almost half (45.5%), of the population biological papers are written by the A-group; much more — 83,1% — in the physical anthropological journals than in the human genetical ones with only 18.7% authors of the A-group.

The following characters had been determined in a content-analyses of the population biological papers:

- 1) The variable systems; they are arranged in 9 classes:
 - Anthropometry
 - Morphology, morphognostic
 - Pigmentation
 - Dermatoglyphics
 - Physiological characters
 - Blood groups and serum-proteins
 - Enzymes and biochemical variables
 - HLA
 - Psychological and ethological characters.
- 2) The number of variables in each system. It seemed more important, however, to count the variable systems than the single characters, *e.g.* seems more important that anthropometry has been considered than that 10, 12 or more measurements were taken.
- 3) The number of population samples which were studied or compared. In this paper samples studied by the author himself and samples taken from the literature for comparison are not distinguished.
- 4) The level of the statistical analysis. Considered here is the share of multivariate methods including correlations and regressions.
- 5) Descriptive versus analytical papers. Descriptive papers are in this classification those which give only the results of the research without processual interpretation or explanation; also those which find significant differences between populations even if multivariate methods have been used. Finally, also those papers which point at the end superficially on processes which could have contributed to the differences; *e.g.* that perhaps gene drift and selection are involved but that further studies have to corroborate (this is a stereotype end of many papers). Analytical are those papers which are according to this classification started from a hypothesis and tried to verify or to disprove it; or whose interpretations are supported by comparisons and statistics. Of course, again the limit between the classes "descriptive" and "analytical" is not to be determined precisely and doubtful cases exist. But as all classifications had been done by one

person (myself), the results of the classification should be comparable.

- 6) An attempt was made to develop an index summarizing all the mentioned characters. At first it had been named Index of Quality, but of course at least the number of variables, the number of samples and the statistical methods tell us nothing on the real quality, the innovation value, the imagination and thus the real importance of a paper. Therefore, the index was called "Index of Content Analysis"; but in any case it tells us something on the formal level of a paper and at least the descriptive versus the analytical character of a paper tells us something about quality. Analytical papers surely range higher in the scale of values of science.

The construction of the Index of Content Analyses may be described shortly: a basic classification was given by the number of samples and some group categories (*e.g.* age and sex). On this basis the index varied from 1 to 9. One, means one variable in one population, not considering age, sex etc. Nine means several variables of two variable systems in several populations. One additional point was given for:

- each additional system of variables
- multivariate methods
- more than 20 populations
- connection of the results with etnogenetical and/or population genetical processes in a verbal manner
- statistical analysis of these connections (*e.g.* correlations between genetical and geographic distance)
- experimental study (*e.g.* in the study of adaptation to low temperature)

The maximum of the index which could be reached (but never has been reached) is 20.

If we look at our table of the main results comparing the A and non-A-group of papers, we see that in the A-group the average of variable systems which have been considered is higher; more frequently a high number of population samples has been compared; the level of statistical analysis measured by the percentage of papers with multivariate methods is higher; and much higher in the A than in the non A-group is

the share of analytical papers. According to the structure of the Index of Content Analysis, it is clear that it is higher in the A-group in comparison with the non-A-group. It may be added that all papers with an index of 12 or more came from the A-group.

I think that these results reflect well the position of biological anthropology and also its self-understanding. Many sciences may contribute to human population biology; genetics may study the distribution of genetic polymorphisms; dentist may compare the dentition of different population samples and so on (and of course sometimes papers of a high level may be published by them). But for biological anthropology, the holistic concept of population is more important than for other specialists who contribute to population biology; and therefore the authors of the A-group try more frequently to comprehend populations from many aspects and to understand the processes of diversification.

In an international inquiry of population biology analysed for the German Conference mentioned in the beginning, it has been asked also for the criteria of quality as to population biological papers. Some of the criteria which had been mentioned are general values of science; quality of the data, rigour of the analysis. But one other criterium mentioned several times seems not to be a general science value: it has been called "spirit of synthesis" or "broadness of perspective" or "broad view on problems". In another inquiry, based on interviews with German biological anthropologists and human genetist (Spiegel-Rösing and Schwidetzky, 1982, pp. 311-312) no differences had been found for some values. The most interesting difference was the higher frequency of the value "bridge-building" (Brückenbildung) in the group of biological anthropologists. This aims at the same point as that mentioned in the answers to the international inquiry: spirit of synthesis, broadness of perspective. It may be added that from other sources it can be seen that German biological anthropologists like to see their science as "Brückenfach" (bridge science).

It seems to me, that there are intercorrelations between the result of our content-analysis and the results of the inquiries on criteria of quality and values. The "spirit of synthesis", the "bridge-building", the broad perspective are not only nebulous ideas or theoretical concepts. They are realized more frequently in papers of biological anthropologist/human

population genetists than in those of other sciences which contribute to population biology.

Summary

The content of 1472 papers on human population biology from 23 physical anthropological and human genetical journals (1971 – 1980), have been analysed. It has been asked if there are differences between the papers of biological anthropologists/human population genetists – called A-group—. On the average the papers of the A-group consider more variable systems, more population samples, they have a higher level of statistical analysis and are more frequently analytical (versus descriptive) papers. They range higher as to an “Index of Content Analysis”. It seems that these results coincide well with specific values of biological anthropology which are called in the answers to inquiries *e.g.* “spirit of synthesis” or “broad perspective”.

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