

DAHLBERG, Wolfgang: *Ordnung, Sein und Bewußtsein. Zur logischen und erkenntnistheoretischen Systematik der Ordnung.* (Order, Being and Consciousness. On the logical and epistemological systematics of order). Frankfurt, DE: Verlag AVIVA W. Dahlberg 1984. XXIV, 641 p., ISBN 3-923935-06-4. Also available via INDEKS Verlag, DM 84,—.

Philosophical works are usually of a very dry and highly conventional nature. This book which was published last year is an exception of this genre and thus exceptional in many ways. The aspect that strikes most readers at the first glance is its very idiosyncratic structure. It follows the well-known literary principle that content and form should be congruous and thus proves quite implicitly that order is the basis of every human activity including the writing of books.

Wolfgang Dahlberg looks at the phenomenon of order from many different points of view and treats it at various levels of abstraction. The main paradigms for the structuring of his chapters are taken from logic, epistemology, linguistics, and first of all from ontology in the widest possible sense. The book offers such an abundance of thoughts leading the reader through almost all philosophical schools — from Kant to Zen — that it would be a distortion of the wonderful synthesis just to pick out a few for the sake of commenting on them within this review.

The enthusiasm and synoeciosis applied to this work reminds me very much of the recent bestseller by Douglas R. Hofstadter "Gödel, Escher, Bach". It also comes down to the very essence of formal structures and while Hofstadter arrives at a braided band, Dahlberg constructs his "quaternate quaternary clarification structure" (cf. his article "The geometry of basic concepts").

The only aspect of human life in which the principle of order plays an essential role, that is hardly represented in W. Dahlberg's book, is the field of art. I regret that this omission was made in particular since religion and art are the prime indicators of human culture and give sense to our being and feeling. Therefore I would like to point out a work which could be read as a supplement to this book since it emphasizes on the philosophical fundamentals of art: it is E.H. Gombrich's „The sense of order”.

On the whole, Wolfgang Dahlberg proves in this work to have a lot of ingenuity, linguistic and rhetoric capability and the skill to detect formal structures and to project them upon each other. Thus the book is a quarry of ideas and insights for classificationists and terminologists. It deals with concepts, propositions, knowledge elements and topics and illustrates their interrelatedness. Furthermore it shows their relevance to our thinking, being and consciousness. The isomorphy between these areas has never been so apparent to me before I read this work.

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GREENACRE, Michael J.: *Theory and applications of correspondence analysis.* London: Academic Press 1984, 364 p.

Correspondence analysis is a versatile, mathematical and geometrical technique for exploring the structure and the mutual relationships existing between the different alternatives  $i, j$  of (basically) two qualitative variables  $X, Y$ . (For illustration, we shall use in the sequel an example where  $X$  denotes one of  $I$  libraries  $i = 1, \dots, I$  and  $Y$  one of  $J$  exclusive subject fields  $j = 1, \dots, J$ .) Generally, the input information are some frequency data which are compiled in a  $I \times J$  contingency table  $(n_{ij})$  (e.g.,  $n_{ij}$  = number of books in the library  $i$  pertaining to the subject field  $j$ ). Correspondence analysis (CA) provides a means for representing each alternative  $i$  of  $X$  ( $j$  of  $Y$ ) by a point  $x_i$  ( $y_j$ ) of the plane such that the mutual distances between points  $x_i, x_j$ , describe (optimally) the amount of similarity/dissimilarity (with respect to  $Y$ , the spectrum of subjects) existing between the corresponding alternatives (libraries)  $i, i'$  of  $X$  (similarly for  $y_j, y_{j'}$ ). From an exhibit of the two clouds of points  $\{x_1, \dots, x_I\}, \{y_1, \dots, y_J\}$  which is usually supported by numerical tables containing specific diagnostic values, the practitioner can easily get insight into the structure of  $X$  and  $Y$  and finds answers, e.g., for the following types of questions: Which libraries show about the same composition of subject fields? Is there a natural classification of libraries? Does there exist a natural ordering of libraries (e.g., from fine arts to technology)? How much is the similarity between libraries influenced by the subject field  $j$ ? Which is the position of an additional library in the constellation of  $I$  libraries investigated? How has the structure of libraries changed between 1970 and 1980?

M.J. Greenacre has succeeded in writing an excellent book on CA and its many modifications, generalizations, and ramifications. Actually, this is the most comprehensive publication on this topic today which unifies the several approaches to CA met during the last fifty years. The book combines an illustrative and sensitive way of explaining the purpose and idea of the method and the interpretation of its results to applied researchers and practitioners (without a firm background in mathematics, but some knowledge in matrix algebra) with a rigorous and self-contained mathematical treatment of the topic (where proofs are usually deferred to the end of the chapters). Since many real case and artificial data are analyzed and commented on, the reader gets a fine feeling for the possibilities and the flexibility of the method as well as for the pitfalls to be avoided. With its large bibliography ( $\approx 300$  titles) and a detailed index, the book will be a standard reference text.

The listing of the 9 chapter headings gives a taste of the wide range of topics treated: 1. Introduction (the problem, the method, the rôle of French statisticians) 2. Geometrical concepts in multidimensional spaces (vector algebra for beginners, distances, optimum subspaces) 3. Simple illustrations of CA (several examples) 4. Theory of CA and equivalent approaches (the algebra of CA, different approaches: reciprocal averaging, dual scaling, canonical correlation analysis, simultaneous linear regressions; biplots, block structures) 5. Multiple

correspondence analysis (generalization to more than two variables, analysis of questionnaires and non-responses) 6. CA of ratings and preferences (bipolar data, doubling strategy) 7. Use of CA in discriminant analysis, classification, regression, and cluster analysis (partitioning rows and columns of a contingency table, classification by majority rules, WARD-type hierarchical clustering using CA) 8. Special topics (stability, bootstrapping, sampling distributions; Petrie matrix, horseshoe effect; constraints; missing data; symmetric matrices; large data sets) 9. Applications of CA (detailed analysis of 12 real case data sets from genetics, linguistics, ecology, palaeontology, psychology, medicine etc.) App. A. Singular value decomposition. App. B. Aspects of computation (e.g. a GENSTAT program).

The book is to be highly recommended as an introduction and a reference work on CA for applied researchers from all fields as well as for mathematicians and data analysts or statisticians.

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**BURGER, H.G.: The Wordtree: A Transitive Cladistic for Solving Physical and Social Problems.** Merriam, KS: Henry G. Burger 1984. 380 p., Hardcover. \$ 149,—

1. Classificationists may well discover, in time, that Henry Burger's *The Wordtree* is an invaluable auxiliary tool to the conventional dictionary, and a systematic book of synonyms, like *Roget's Thesaurus*. Without replacing them, it adds greatly to their utility by means of a new paradigm for lexical and classificatory analysis.

Like a conventional dictionary, *The Wordtree* offers definitions of words — not of all words found in English, but surely all of its transitive verbs. Like the *Thesaurus*, it arranges its entries in a classified hierarchy, followed by an alphabetical index. However, the taxonomy proceeds by levels of abstraction/concreteness rather than by subject.

The focus on verbs reflects a *dynamic* orientation, by contrast with the *static* point of view found in nouns. According to Burger, the underlying philosophy of his work "views the world as a series of environment-affecting processes of increasing complexity — a growing tree of evolutionarily-adaptive branches." (p. 14)

Classificationists used to hierarchic schemes that proceed from the top down will have to accustom themselves to a "tree" metaphor that goes from the bottom up, from a "trunk" whose most abstract term is to CREATE, to proliferating branches that increase in complexity, number and concreteness (specificity) as they go upwards and outwards, reaching an incredible total of some 24,600 transitives, 30% more than may be found in the vast Oxford English Dictionary, according to Burger. (p. 12)

2. The trunk starts, in the hierarchical records, with the antonymic concepts of CREATE/UNCREATE — whenever a term can be found for it, each verb is paired with its antonym. The 42 "actemes" — Burger's shorthand for transitive verbs — identified as "primitives" after (above) CREATE include, for example, to: RELATE, NEED, CHANGE, AGREE, FIT, EQUAL,

ORDER, FREE, MAXIMIZE, SINGULARIZE, POWER, GATHER, CENTER, MATERIALIZE, UP, DOWN, IN, OUT, TEMPORIZE, INTEGRATE, PARTNER, EMOTIONALIZE.

At the next higher level more specific actemes are identified in numbered categories that build on the 42 primary types of creating. Thus, subsumed under CHANGE we find that to AFFECT means to change (genus) and to relate (specifica). Under to EQUAL we discover that to EXCHANGE means to equal and to change; to MATCH means to equal and to fit.

After presenting each of the 2nd level actemes in a numbered series, using higher numbers for their sub-actemes, a third series begins headed by each of these narrower terms which, then, generate a fourth series at yet a higher level. The notation system does not identify the successive levels of abstraction. However, the sequential numbering of all actemes does facilitate reference to individual items.

Since all the defining characteristics have serial numbers that are lower than the number assigned to a definiendum, the classification scheme is truly faceted; previously identified concepts are used (entailed) in subsequent definienda. Put differently, each characteristic found in the continuous series of hierarchically numbered actemes (what Burger calls a "cladistic" or "evolutionary branchers") is defined before it is used to help define another process — i.e. every new concept is defined in serial order before it is entailed in another definition. By this means the circularity so often found in dictionary definitions — according to Burger's claims (p. 21–C25) — has been avoided.

Systematic attention to hierarchic levels also enables Burger to reduce the definition of every acteme to two characteristics that are more general concepts — i.e. the genus proximum and the differentia specifica of Aristotle's analytic definitions. However, for modern readers, Burger refers to this structure as composed of "the just-simpler procedure" and an "addendum".

3. The alphabetical index contains all the actemes, plus their two-term definitions and serial numbers, thereby enabling users to locate the point in the main structure of hierarchic records where the sub-actemes of each acteme are numbered and characterized.

The index, incidentally, contains more than verbs: it includes also nouns and other word-forms, in alphabetic order, when they can be linked to verbs. For example, cause/effect symbols indicate how verbs may be related to nouns: thus after CLOTHESPIN one finds FASTEN as a "cause" (i.e. one "fastens" a clothespin). After CLIENT one finds to PATRONIZE as an "effect" (i.e. a client "patronizes" a patron). Preventive relations are also indicated: thus after MANEUVERING one finds that to prevent it one may use FINESSE. An "instrumental" (permissive) relation also suggests one way to accomplish a result: e.g. after REACHING one finds that to SEND or to TRANSMIT may accomplish this effect.

4. To guide users Burger has prepared an extensive — the equivalent of about 240 ordinary pages — explanation of the theory, structure, history, and methods involved in his massive work. He warns his readers, for example, to start any inquiry with the alphabetical index because it is easier to interpret than the hierarchic text which should, of course, be subsequently consulted.