argues for the inadequacy of hierarchical classification schemes and for the superiority of cyclical, self-adjusting networks. For these latter two groups of readers, the book is a "must read."

Frederick Suppe
Committee on the History and Philosophy of Science. 1131 Skinner Hall, University of Maryland College Park, Md. 20742, USA

ELLEN, R.F. and REASON, D. (Eds.): **Classifications in their Social Context**. London: Academic Press. 1979.

Classifications in their social context is a collection of papers presented at a two-day seminar on "Systems of Classification and the Anthropology of Knowledge", held at the University of Kent at Canterbury in June 1977. (One paper, published elsewhere, was omitted, and another, Bulmer, was added.) The purpose of the seminar was to address the following questions: "What is the logic of classification? What are its material, social and psychological determinants, correlates and corollaries? How, empirically, are "classifications" to be identified, elicited and described? How, theoretically, may they be compared and elucidated?" (Preface, p. vii). The data presented were drawn predominantly from studies of folk classification and scientific taxonomy, and were intended to raise issues relating to the universality and necessity of classification as a conceptual order for the comprehension of "the world" (p. viii).

According to Ellen's introductory essay, classification itself became a legitimate object of philosophical and ethnographic study in 1901–1902 with the publication of Durkheim and Mauss' "De quelques formes primitives de classification". The essay traces the debate between the "social constructionists", followers of the Durkheimian tradition, and the American ethnoscientists, and highlights the need for a metatheory to deal with the different approaches. Ellen views classifications as "discursive practices situated in a given social matrix and general configuration of knowledge and ideas . . . and . . . products of specific histories" (p. 17). The aim of research is to answer the question, "How far can we really predict that particular kinds of societies and ideologies will give us particular kinds of classification systems?" (p. 26). To this end, Ellen proposes the following set of variables for the description of individual classifications: variability; arbitrariness; expression of inclusiveness; anomaly; structural complexity; terminology, nomenclature and taxonomy; and integration in semantic fields. "A marriage between the formal (ethnoscientific) and the sociological approaches" is needed, he maintains, in which empirical generalizations and phenomenological descriptions of classifications are supplemented by studies of underlying mechanisms. This is precisely what the seminar papers are intended to provide.

Chapter 2 presents data from the natural classification of the Rangi of Tanzania, speakers of a Bantu language. The author, John D. Kesby, who lived among the Rangi from 1963 to 1966, attempts to support a Rangi view of the universe in which living creatures are first divided between immobile (plants) and mobile (animals). The former category contains two classes distinguished on the basis of size and/or woodiness; the latter has three classes: *ndee* (birds and bats), *"vanyama"* (mammals, except bats and people) and *makoki* ("creeping things"). This classification is attributed to a "three-tiered" view of the universe which is claimed to occur "in all the major cultural regions of the world" (p. 41), namely, a division of events and objects into those of the sky (above), those of here, where people are (here), and those more lowly than people (below/water). In order to support this tripartite division, Kesby presents convincing cultural, geographical and historical evidence that the category *samaki* 'fish' belonged originally to the category *makoki*. In other places, however, the argument is flawed by self-contradiction and premature conclusions which are not adequately supported by the Rangi evidence presented. The analysis is based on "some five hundred terms", although the author stresses that there are "probably many more" (pp. 52–53). Explicit reference is made to the pioneering research of Brent Berlin in folk classification; and indeed, some of the evidence supports Berlin's findings (e.g., the existence of implicit, unnamed categories, and the prominent role of perceptual attributes – size, shape and color – in classification). On the other hand, Kesby stresses the differences between scientific biological taxonomy and vernacular folk classifications, whereas Berlin and his associates had stressed the resemblances: In containing two, or at most three levels, says Kesby, the latter "differ from post-Linnaean naturalists . . . but they resemble all other groups of people whose classifications have been even partially investigated" (p. 53); "implicitly . . . Rangi do subdivide the major categories and group the categories within them; but this does not alter the essentially two-tier arrangement, since the process is implicit and there are no terms to denote the groups so formed" (p. 43). The extent to which this is true remains a controversial issue, but nonetheless the chapter remains a very interesting and well-constructed exercise in explanation.

Ralph Bulmer's chapter on the Kalam (New Guinea) classification of birds is a sequel to his 1978 paper "Totems and taxonomy", in which, following Radcliffe-Brown, he attempts to demonstrate that those creatures with particular salience in the everyday folk classification are also those which are embued with mystical significance. The present paper is a reply to two criticisms of the first paper: circularity in the exposition of the connection between ritual marking and taxonomic status; and subjectivity of judgments of taxonomic salience. The greater part of the paper is a response to the second criticism, using the data on birds collected by Ian Saem Majnep, a long-term Kalam assistant. Through a careful "-emic" analysis of the general classification of birds, using the notions of covert categories, natural taxonomy ("the grouping of phenomena in terms of degrees of general similarity based on multiple criteria" – p. 63) and Kalam cultural patterns of thinking, Bulmer attributes general taxonomic salience to birds of taxonomically-defined natural groups, or culturally-defined "unnatural" groups, exhibiting one or a combination of factors including size, plumage, habitat, feeding habits, and manner of interaction with man. These same species appear to account for "nearly all" the birds of ritual significance. The author illustrates the interplay of these factors using the work of his trained Kalam assistent in ordering the chapters for an ornithological monograph; but the author himself admits the

degree to which Saem may have been influenced by long association with Western "expatriate anthropologists and naturalists", and the reader, like the author, is left unsatisfied.

Claudine Friedberg continues Bulmer's inquiry in the next chapter, posing the question of "the relations between the order which a population establishes in nature and the rest of its culture" (p. 83), with the intention of illustrating the problems in this kind of analysis. Her viewpoint is that of the French school of ethnological surveys, and the goals of ethnology are to gather information about the "functioning and evolution of a certain type of society", rather than to explore the "universal human mind" as would Brent Berlin. After pointing out the objections to her approach, Friedberg discusses the classificatory position of a number of "socially marked plants" in the folk classification of the Bunaq of Timor. The article effectively highlights the unanswerable questions which arise in an attempt to explain the symbolic role of a plant in Bunaq culture in terms of the notion of taxonomic salience, and concludes that "the location of the plant within the classification is not sufficient to explain the role attributed to it by a given population; it must also be placed in the wider cultural context" (p. 98). Nonetheless, the comparison of a plant species with others in the same category, in conjunction with other cultural, bio-geographic and historical information, remains a safe method to obtain clues for the understanding of the symbolic role of a plant, the goal always being the clarification of aspects of the wider culture. For the reader looking for clues to the logic of classification, Friedberg's paper provides no answers, but rather a glimpse of the toil and frustrations of the researcher in trying to establish the correlations illustrated here and in Ellen and Bulmer above.

A welcome point of clarification in the ongoing discussion is provided by the noted anthropologist Eugene Hunn in the following article entitled "The Abominations of Leviticus Revisited". The title refers to the well-known 1966 study by Mary Douglas (Purity and Danger: An Analysis of Concepts of Pollution and Taboo. London: Routledge and Kegan Paul) which underscored the role of anomaly in explaining the Biblical prohibitions against the eating of certain animals. Hunn distinguishes the explanatory strategy of cognitive anthropologists such as Conklin and Berlin ("students of folk classification in the ethnoscience tradition") from that of symbolic anthropologists "in the French structuralist tradition" such as Lévi-Strauss, Leach and Douglas. According to Hunn, the two schools differ significantly in the role they ascribe to material reality. (It is suggested in a note that the lack of synthesis of the two points of view may be due to the emphasis of the former on the "technical" and the latter on the "expressive" aspects of human behavior). The symbolic anthropologists have sought consistent and comprehensive "-emic" explanations in the *systemic* properties of particular cultures (p. 104), while minimizing the role of the material "-etic" existence of the culture: "A symbol based on mistaken information can be fully effective as a symbol" (Mary Douglas, 1957, "Animals in Lele religious symbolism." *Africa,* 27, p. 56 – quoted by Hunn, p. 105). In addressing the issue of how certain animals acquire symbolic significance in a given culture as a case in point, Hunn's own strategy is to reinterpret Douglas' classic analysis from the point of view of a cognitive anthropologist. (It should be remembered that Hunn himself has written in the enthnoscience tradition, and his paper can be read as an apology of that approach.) The author shows adeptly how a consideration of the scientific classification of mammals may explain the class of edible beasts as well as the class of abominations. The treatment of birds is somewhat less elegant, which leads Hunn to conclude: "Perhaps the symbolic anthropologists demand too much in requiring logical perfection of any cultural expression . . . animal categories are conditioned simultaneously by cognitive processes and by the structure of the world perceived" (p. 112). The recognition of anomaly in symbolic systems, asserts Hunn, may thus be seen as a creative human response to the perception of infrequent trait complexes in the natural environment – a plea for eclecticism and open-mindedness. "Idealist and materialist explanations flank the truth" (p. 114).

The next essay by Brian Morris is yet another plea to "steer clear of both the mechanics and the mystics" in attempting to explain the existence of elaborate symbolic or ritual classification systems in some cultures. The paper provides no original data, but draws on the extensive literature on Navajo folk classification. Morris is critical of the "symbolist" analyses of Lévi-Strauss and Douglas, which suggest that all classifications among preliterate people are part of an all-embracing symbolic taxonomy. He supports the view that "symbolic classifications are not everything, and that . . . they have sociopolitical functions" (p. 134). Symbolic systems (notably less prevalent among hunter-gatherer cultures or tribal communities, than among the early theocratic states of, say, the Aztec, Mesopotamian and early Asiatic cultures) constitute ideologies, the purpose of which is "to obscure the fact that specific social relationships are exploitive" (p. 134) and to maintain the normative structures of a society. Morris' argument is based on data from Navajo ethnoentomology which show the close correspondence between scientific biological taxonomy and the Navajo non-religious folk classification. The few cases of anomalous classification (insects not classified according to morphological characteristics, and thus forming categories which do not correspond to scientific biological taxa) appear to be clear instances of insects possessing ritual significance. They appear in the symbolic cosmological classification, which is to be distinguished from the non-religious technical folk classification. The purpose of ritual observance among the Navajo is to maintain universal harmony; thus any attempt to ascertain the meaning of specific symbols within the symbolic classification misses the point. Morris' essay contains critical responses to a considerable number of researchers who, from different points of view, have explored the basis of symbolic classifications (including "Marxist" analyses in anthropology); and it provides an alternative rationale for the existence of ritual or symbolic conceptual schemata. However, the question of *why* certain species are imbued with mystical significance remains unanswered, and the article remains an interesting conjecture.

The remarks contained in chapter 7 are – in the author's own words – "those of a naturalist without much

knowledge of either anthropology or linguistics" (p. 143). Here it is contended that more attention has been paid to the static formal structure of folk classification systems than to the way in which they function. A suggested method of examining the principles of classification is to see how a native folk classification copes with unknown objects, as in the case of the introduction of exotic plants into a culture, or the naming behavior of migrant peoples in a new natural environment. Examples from the introduction of American crops in Europe (e.g., corn, potato) and from introduced plants in the Malayo-Oceanian area yield the expected conclusion that new species are classified in relation to established "standards of reference" in the existing classification system, chosen on the basis of economic, morphological or a combination of criteria. This type of classificatory behavior – approximation to a prototype – has been described elsewhere in the literature. The main interest of Barrau's presentation lies, rather, in the data presented and in its stress on the need to study the thought processes underlying the systems of folk classification so richly documented in the anthropological literature.

Chapter 8, the third contribution by a member of the Laboratoire d'Ethnobotanique et d'Ethnozoologie of the Museum of Natural History in Paris, is a reevaluation of the work of the 17th century Dutch naturalist Georgius Everhardus Rumphius in the light of the concerns of modern students of folk classification. The hitherto neglected works of pre-Linnaean naturalists, the author Alice Peeters contends, contain much useful evidence for enthnobotanists of the methods and criteria used by native peoples in organizing nature. Contrary to earlier judgments of the *Herbarium Amboinese,* Rumphius' classification is not based on utilitarian criteria alone, but was heavily influenced by the native Malay folk classification and exhibited two complementary approaches: the establishment of hierarchically-ranked taxonomic levels, and the grouping of plants according to degrees of morphological similarity. The latter approach resulted in an associative network arrangement which, Peeters remarks, necessarily arises when "criteria of different kinds are employed in the classification process without a definite ranking of their relative importance" (p. 154). The highest taxonomic level in Rumphius' work includes the well-known folk categories of tree-shrub-vine-herb; the criteria of cultivation and economic use structure the categories at the next most inclusive level; at the intermediate and terminal taxonomic levels, however, the Malay influence and the primacy of morphological considerations become apparent. The author's case is well-made, and the principles of classification suggested support the findings of more modern explorations of folk classification.

In chapter 9 the focus of the discussion shifts from folk classification to a consideration of the critical tradition of the classification of the sciences, which enjoyed its heyday in the nineteenth century, "the period when there was a self-conscious tradition of developing new classifications on the basis of criticism of previous schemes" (p. 171). R.G.A. Dolby outlines the major pre-19th century influences which fostered the tradition, characterizes the major writers who contributed to the discussion, and notes reasons for the decline of interest in the subject in the 20th century. The paper is explicitly intended to complement R. Flint's 1904 exposition, "Philosophy as Scientia Scientarum and a History of Classification of the Sciences". The end of the 18th century witnessed a confluence of several factors which stimulated interest in classifying the sciences. Among them were the success of biological classification, the large number of classification schemes available (most of them byproducts of philosophical positions), the rise of encyclopaedism, the growth of an inductive philosophy of science, and a concern for the unification of scientific knowledge. Dolby highlights the influence of Bacon and D'Alembert on the major 19th century figures, the most prominent of which were Comte and Ampère, whose approaches, attempts to find unifying principles, and limitations are discussed at length. The English tradition, linked to the development of the inductive method, is represented by Sir John Herschel, William Whewell, John Stuart Mill, Herbert Spencer and Alexander Bain. A major issue in the debate, made explicit by Spencer, "was whether or not there can be a logical, linear ordering of the sciences" (p. 183) as Comte had claimed. The Italian point of view, reflecting the influence of Roman Catholic thought, and the approach of late 19th-century German philosophy, represented by Wilhelm Wundt, are briefly featured. Dolby attributes the decline of interest in classifying the sciences in the 20th century to "the increasing artificiality of the main lines of discussion" (p. 187): the original practical contexts which had stimulated the tradition had developed in other directions; interest in encyclopaedic arrangements of knowledge had declined; and science had taken on a new role in society – with attention to its potential applications and to its methodological foundations. This exploration of the relationship between the prevailing intellectual climate and the activity of classification provides a welcome historica perspective for viewing the classifications *of* the sciences, but also the classification of objects of study *within* the sciences, as exemplified in the foregoing chapters. However, as is necessarily the case in such survey articles, too little attention is devoted to each classification for its "logic" to become apparent.

The following paper provides us with a critical discussion of Berlin and Kay's *Basic Color Terms* from a philosophical viewpoint. The author, John Bousfield, disputes Berlin and Kay's claim to have discovered "universal semantic categories" of color perception, by attacking their methodology and their notion of a basic color term. Bousfield suggests that the data are also amenable to a different interpretation based on the Wittgensteinian idea of rules of classification – yielding widely different conclusions. Berlin and Kay's research, he maintains, falls prey to an "epistemological chauvinism" in its reliance on the eleven "basic color terms" of English, and on the color chart method for elicitation of evidence. Many of the points are well-made and do indeed cast doubt on the validity of the Berlin and Kay studies (for example, the notion that the so-called basic color terms may in fact be "summary terms" rather than simple names of perceptual categories). In other places, however, Bousfield seems to misconstrue the goals of the latter research (as in his allusions to mistranslation). But in his careful attention to methodology and underlying assumptions, the author has made an important contribution to the enterprise of classification research.

Continuing the examination of methodology, the final paper by David Reason questions the very notion of classification as a basis for an anthropology of knowledge. Classification, as opposed to the "categorization" of natural language, is an analytic operation "which dissect[s] entities so that either the truth or falsity of particular predicates may be established in their cases" (p. 223). It is the dominant "mode of signification" in our capitalist society. The dominant mode of signification in a culture, it is claimed, is determined by the way in which production is organized. In non-capitalist cultures – such as the Polish peasant family farm – a different mode of signification is dominant. The appropriate categories for a description of that culture are thus essentially different: "Those entities which signify for us signify not at all there" (p. 228). This is illustrated through a lengthy and somewhat mystifying discussion of the notion of "textual time" (as opposed to the "abstract time" prevalent in our capitalist thinking) which concludes that the peasant consciousness is not symbolic and not based on the "empiricist conception of a subject-object dichotomy" (p. 240); it is therefore not amenable to classificatory description in the usual sense. The paper is interesting, again, for its attention to methodology and underlying assumptions. One is hard put, however, to agree with the author that the material on the peasant family farm in the long, rambling section II was always justified and to the point.

The contributors to this volume, as we have seen, attack a common conceptual problem from the different viewpoints of philosophy and anthropology. (This limited perspective becomes apparent when we consider the curious fact that the important work of the psychologist Eleanor Rosch on universals of classification is nowhere cited.) Although the studies of folk classification predominate, they are nicely complemented by the broader perspective of the philosophy of science in the final essays. The questions posed at the outset have not been answered, but the volume of papers had admirably illustrated the complexity of the issues. There are gaps, of course; nevertheless the book can be recommended as representative of the promising trend toward interdisciplinary cooperation in problem-oriented research.

Rhoda Kesselman
Department of Linguistics
University of California
Berkeley, CA 94720 U.S.A.

WINGERT, F.: **Medizinische Informatik.** (Medical Informatics) Stuttgart: Teubner 1979. 272 p., 68 figs., 18 tabl., 178 refs., DM 19.80 (In German). = Leitfäden der angewandten Informatik.

This publication is a handbook-like compilation of problems and methods in medical informatics which could be used even as a text book for special courses concerning the topic "medical informatics". The author described the following sub-disciplines in particular regarding them as essential concepts of medical informatics: basic concepts of informatics, statistical decision models and -strategies, mathematical classification, classification of concepts, medical linguistics, data structures in medicine, relations, data input and error checking, generation of information, representation of information, information systems, and real time data processing.

The chapters "classification" and "medical linguistics" being of particular interest to the reader of this journal, are given 96 pages altogether. The chapter "classification" is split into the two parts "classification of concepts" and "mathematical classification" (i.e. numerical classification). The fundamental problems in numerical classification are illustrated: arranging concepts according to a given classification scheme by a special algorithm (in this publication called "classification of first order") and establishing a classification (called "classification of second order"). The author classifies questions of decision finding, support, and strategy also as classification problems.

In the description of problems concerning the classification of concepts special consideration has been given to basic linguistical topics.

The semantic dimensions of medicine given are similar to the facet principles of Ranganathan. In addition, the basic classification systems for clinical purposes are described. Thus, the classification problems encountered are viewed both from theoretical and pragmatic points of view. Many of the problems are seen through the glasses of a person working in the field of medicine, though; they can only be generalized in certain aspects. On the other hand, this orientation toward application in medicine is an advantage of the book, since practical problems can be illustrated very well for medically informed people. In spite of the fact that the book is mathematically-oriented, non-mathematicians in the field of classification would have no difficulty in comprehending it as all the formulae have been explained in a detailed manner.

This book is recommended to all libraries and library schools involved in the theory and practice of classification in various fields of science.

Rolf G. Henzler
Fachhochschule für Öff. Verwaltung,
FB Wiss. Bibl. und Dok.wesen, PF 769
7000 Stuttgart

KAZMIERCZAK, H. (Ed.): **Erfassung und maschinelle Verarbeitung von Bilddaten. Grundlagen und Anwendungen.** (Input and machine processing of pictorial data. Foundations and applications) (In German). Wien: Springer Verlag 1980. 399 p.

Das Buch ‚Erfassung und maschinelle Verarbeitung von Bilddaten' gibt mit Einzelbeiträgen von 29 Autoren eine komprimierte Darstellung der Grundlagen und der Anwendungen dieses Gebietes. Damit wird gleichzeitig – insbesondere bei den Anwendungen – eine Übersicht über Aktivitäten entsprechender Forschungseinrichtungen in der Bundesrepublik gegeben.

Nach Einführung der grundlegenden Begriffe der Bildverarbeitung werden zunächst die Geräte vorgestellt für die Eingabe von Bildern in digitale Verarbeitungssysteme und für die Ausgabe gespeicherter oder verarbeiteter Bildinformationen. Verarbeitungsschritte, die häufig auf die Bildaufnahme folgen, werden durch lokale Operatoren und lineare Transformationen beschrieben. Statistische Klassifikatoren und die Bildanalyse werden sehr