

Additions to Part 1

To 2.1.2 (General works with systematic surveys; Works published after 1952)

Hargittai, I. and Hargittai, M. (in prep.) *Symmetry: A Unifying Concept*, Bolinas, Calif.: Shelter Publications.

Rosen, J. (in prep.) *Symmetry in Science: An Introduction to the General Theory*, New York: Springer.

Sivardière, J. (in prep.) *La Symétrie en mathématiques, physique et en chimie*, [Symmetry in Mathematics, Physics, and Chemistry, in French], Grenoble Sciences, Saint-Martin-d'Hères (Isère), France: PUG.

To 2.2.2 (Pattern analysis: comprehensive surveys)

Jablan, S. V. (1984) *Teorija simetrije i ornament*, [in Serbo-Croatian], Beograd: APXAIA, 344 pp.; Rev. English trans., *Theory of Symmetry and Ornament*, Beograd: Matematički institut, in prep.

To 2.2.3 (Pattern analysis: special fields)

Abas, S. J. and Salman, A. S. (in prep.) *Symmetries of Islamic Geometrical Patterns*, Singapore: World Scientific.

McDowell, R. B. (in prep.) *Symmetry: A Design System for Quiltmakers*, Lafayette, Calif.: C and T Publishers.

Tarayan, Z. R. (1989) *Simvolj simmetrii ornamenta v armianskom prikladnom iskusstve*, [Symbols of Ornamental Symmetry in Armenian Applied Arts, in Russian], Erevan, Armenia: Izdatel'stvo Akademii Nauk Armyanskoj SSR, 198 pp.

Dénes Nagy

SYMMETRIC REVIEWS 4.4

The "Symmetric Reviews" (SR), as a regular subsection, publishes notes on books and papers. These are not conventional reviews; their main goal is to emphasize the connections with symmetry and, in some cases, the required background.

Correspondence should preferably be sent to both the section editor (for reviewing) and the Symmetrion in Budapest (for the data bank).

SR 4.4 – 1 (Ethnomathematics: Polynesian, languages)

Begg, A[ndy] J. C., ed., *Mathematika Pasefika: Vocabulary Database (Version 2.0)*, [in English, Maori, Cook Islands Maori, Fijian, Hawaiian, Niuean, Samoan, Tokelauan, Tongan, Tahitian, Tuvalu, Wallis and Futuna], Unesco Conference, 17-24 November 1991, Hamilton, New Zealand: Centre for Science and Mathematics Education Research, University of Waikato, 1991, iii + 157 pp.

This is a remarkable step in the framework of an ongoing project to develop a school mathematics vocabulary in many languages spoken in Polynesia. As a first step, a list of basic terms was prepared in English with definitions. The main goal is to find the equivalent of these terms, if any, in the languages under consideration. Bill Barton and Te Taura Whiri i te Reo Māori (Maori Language Commission) prepared the Maori version of the original list, while the Department of Education of Tokelau provided the Tokelauan vocabulary. In addition to this, Stephen Williams, a student-researcher, made searches in further dictionaries. (Note that, according to the list of the references, he had no access to many fine dictionaries, e.g., Hawaiian, Tahitian, Tongan, Niuean). In the second circle, the participants of the *Mathematika Pasefika Conference*, mostly education officers and some interested teachers and researchers, contributed to extend and sometimes correct to original database in their languages: the result is the present version 2.0. The organizers invited delegates from many countries of the region. There were no representatives, however, from Hawaii or Tokelau, while the French Polynesian delegation came from Tahiti with no member from the distant Wallis and Futuna. Thus, some of the listed languages show rather the goals than the actual results: the places for the expressions in Hawaiian, Tuvalu, and Wallis and Futuna are still empty at all keywords in the dictionary. In addition there are just few expressions in Tahitian and Tongan. (The latter is a bit surprising because there is a strong tradition to teach mathematics using the Tongan language; moreover, there is a scientific dictionary in Tongan published by Futa Helu at the 'Atenisi University in Tonga.) The book, after an introduction, has three major parts: (1) *Word lists* (pp. 4-24), numbers, ordinal numbers, fractions, months, seasons, days, polygons, polyhedra, angles, compass directions, time, money, prefixes, mass (weight), length, area, volume and capacity, traditional counting, traditional measurement of length, pre-mathematics vocabulary (color, size); (2) *Dictionary, A-Z* (pp. 25-146); (3) *Concept maps* (pp. 147-157), mathematics, number, operations, relations, algebra (and calculus), measurements and units, shapes, transformations, statistics, equipments (this part is in English only). The *Dictionary* part includes many symmetry-related terms, e.g., axis of symmetry, centre of rotation, congruent, cube, equilateral triangle, glide reflection, golden section, grid, group (algebraic structure), half turn (180°), identity transformation, invariant, inverse element, inverse operation, invert (turn upside down), line of symmetry, line symmetry, mid-point of a line segment, mirror line, order of symmetry, palindrome, pattern, proportion, reflect, reflection, regular polygon, regular polyhedron, rotation, sphere, square, symmetrical shape, symmetry, tetrahedron, translation, upside down (inverted). Incidentally, we think that the definition of symmetry as "the property of mapping onto oneself with a reflection or a rotation" (p. 134) is incomplete even at level of school mathematics. We do not see any reason to specify here just reflection and rotation as possible mappings, and thus to exclude translation and glide reflection, which are also given keywords in the dictionary, as well as listed among the basic isometries at the concept map "Transformations" (p. 155). There are also some other minor problems (e.g., some definitions are a bit fuzzy, see regular polyhedron, similar figures, etc.) that can be easily corrected in later versions. We hope very much to see the further developments of this project: it provides an invaluable handbook not only for the obvious target, the educators of mathematics in Polynesia, but also for all people in the world interested in mathematical thinking and related ethnomathematical, historical, and psychological aspects. Because of the great importance of this book, it will be

reviewed in more detail later. Illustrations: various figures illustrating keywords of the *Dictionary*, ten concept maps, and the geographical map of the region (inside back cover). References: 14 (p. 1). Address: Andy Begg, Centre for Science and Mathematics Education Research, University of Waikato, Private Bag 3105, Hamilton, New Zealand.

SR 4.4 – 2 (Ornamental art: Fijian; Ethnomathematics: Fijian, geometric design; Anthropology: Fijian, textiles)

Crowe, Donald W. and Nagy, Dénes, Cakaudrove-style *masi kesa* of Fiji, *Ars Textrina*, 18 (1992), 119-155.

Cakaudrove (Thakaudrove) is a province of Fiji at the Eastern part of this island country, while *masi kesa* is the Fijian word for tapa (bark cloth) which is decorated. This paper is based on the results of an anthropological and ethnomathematical field work of the authors, both are originally mathematicians, in the region. The Cakaudrove-style tapa is decorated usually with black-and-white geometrical motifs. After a brief introduction and a short discussion of the *masi kesa* in Fiji, the mathematical backgrounds of pattern analysis are summarized. This includes both the history of this topic and some technical details addressed to the non-specialist reader. Specifically, all of the possible 7 types of strip patterns (friezes) and 17 types two-dimensional patterns (wallpapers) are discussed using the original figures of Niggli and of Pólya, respectively, and giving the modern notation for them. In the latter case a flow chart is also provided, which is a useful tool to identify the symmetry-types of periodic patterns (it is adapted from Washburn and Crowe, *Symmetries of Culture: Theory and Practice of Plane Pattern Analysis*, Seattle, Wash.: University of Washington Press, 1988). Following this survey, a catalog of black-and-white pattern types used in Cakaudrove is given. Specifically 12 of the total 17 types of two-color strip patterns and 12 of the total 46 types of two-color two-dimensional patterns are presented. The Cakaudrove patterns are compared with the figures by Woods, a textile-specialist, who firstly described the exhaustive list of two-color patterns in 1935-36 and illustrated them with tilings. The similarity of some striking details and the fact that Woods studied in Oxford where one of the museum has a Cakaudrove cloth lead to the speculation that “[...] Woods had seen Cakaudrove *masi kesa* and was influenced by what he had seen when he invented his patterns.” (p. 134; see some further notes on this topic in the paper “Symmetric patterns and ethnomathematics in the South Pacific: Inspiring research and helping education” by D. Nagy in this issue). The stencils of basic motifs used by Fine Nailevu of Somosomo village, Taveuni island, Cakaudrove – the authors call her “the professor of *masi*” – are cataloged, too, giving their Fijian names with English translation and various comments. While the literature on symmetry of patterns focus, with a few exceptions, on global symmetries, the method of stenciling the Cakaudrove patterns demonstrate the importance of local properties in the construction of global symmetry (p. 126). On the other hand, just to consider the ‘check-list’ of motifs would be misleading, because the regional characters are frequently expressed in the overall pattern, i.e., in the global symmetry (p. 141). Illustrations: 15 (including many multiple figures). References: 21. Address: Donald W. Crowe, Department of Mathematics, University of Wisconsin, Madison, WI 53706, U.S.A.; Dénes Nagy, refer to the Board of ISIS-Symmetry.

Dénes Nagy

There are many disciplinary periodicals and symposia in various fields of art, science, and technology, but broad interdisciplinary forums for the connections between distant fields are very rare. Consequently, the interdisciplinary papers are dispersed in very different journals and proceedings. This fact makes the cooperation of the authors difficult, and even affects the ability to locate their papers.

In our 'split culture', there is an obvious need for interdisciplinary journals that have the basic goal of building bridges ('symmetries') between various fields of the arts and sciences. Because of the variety of topics available, the concrete, but general, concept of symmetry was selected as the focus of the journal, since it has roots in both science and art.

SYMMETRY: CULTURE AND SCIENCE is the quarterly of the *INTERNATIONAL SOCIETY FOR THE INTERDISCIPLINARY STUDY OF SYMMETRY* (abbreviation: *ISIS-Symmetry*, shorter name: *Symmetry Society*). *ISIS-Symmetry* was founded during the symposium *Symmetry of Structure (First Interdisciplinary Symmetry Symposium and Exhibition)*, Budapest, August 13-19, 1989. The focus of *ISIS-Symmetry* is not only on the concept of symmetry, but also its associates (asymmetry, dissymmetry, antisymmetry, etc.) and related concepts (proportion, rhythm, invariance, etc.) in an interdisciplinary and intercultural context. We may refer to this broad approach to the concept as *symmetrology*. The suffix *-logy* can be associated not only with knowledge of concrete fields (cf., biology, geology, philology, psychology, sociology, etc.) and discourse or treatise (cf., methodology, chronology, etc.), but also with the Greek terminology of proportion (cf., *logos*, *analogia*, and their Latin translations *ratio*, *proportio*).

The basic goals of the *Society* are

- (1) to bring together artists and scientists, educators and students devoted to, or interested in, the research and understanding of the concept and application of symmetry (asymmetry, dissymmetry);
- (2) to provide regular information to the general public about events in symmetrology;
- (3) to ensure a regular forum (including the organization of symposia, congresses, and the publication of a periodical) for all those interested in symmetrology.

The Society organizes the triennial *Interdisciplinary Symmetry Congress and Exhibition* (starting with the symposium of 1989) and other workshops, meetings, and exhibitions. The forums of the Society are *informal* ones, which do not substitute for the disciplinary conferences, only supplement them with a broader perspective.

The Quarterly - a non-commercial scholarly journal, as well as the forum of *ISIS-Symmetry* - publishes original papers on symmetry and related questions which present new results or new connections between known results. The papers are addressed to a broad non-specialist public, without becoming too general, and have an interdisciplinary character in one of the following senses:

- (1) they describe concrete interdisciplinary 'bridges' between different fields of art, science, and technology using the concept of symmetry;
- (2) they survey the importance of symmetry in a concrete field with an emphasis on possible 'bridges' to other fields.

The Quarterly also has a special interest in historic and educational questions, as well as in symmetry-related recreations, games, and computer programs.

The regular sections of the Quarterly:

- **Symmetry: Culture & Science** (papers classified as humanities, but also connected with scientific questions)
- **Symmetry: Science & Culture** (papers classified as science, but also connected with the humanities)
- **Symmetry in Education** (articles on the theory and practice of education, reports on interdisciplinary projects)
- **SFS: Symmetric Forum of the Society** (calendar of events, announcements of *ISIS-Symmetry*, news from members, announcements of projects and publications)
- **Symmetro-graphy** (biblio/disco/software/ludo/historio-graphies, reviews of books and papers, notes on anniversaries)

Additional non-regular sections:

- **Symmetrospective: A Historic View** (survey articles, recollections, reprints or English translations of basic papers)
- **Symmetry: A Special Focus on ...** (round table discussions or survey articles with comments on topics of special interest)
- **Symmetric Gallery** (works of art)
- **Mosaic of Symmetry** (short papers within a discipline, but appealing to broader interest)
- **Research Problems on Symmetry** (brief descriptions of open problems)
- **Recreational Symmetry** (problems, puzzles, games, computer programs, descriptions of scientific toys; for example, tilings, polyhedra, and origami)
- **Reflections: Letters to the Editors** (comments on papers, letters of general interest)

Both the lack of seasonal references and the centrosymmetric spine design emphasize the international character of the Society; to accept one or another convention would be a 'symmetry violation'. In the first part of the abbreviation *ISIS-Symmetry* all the letters are capitalized, while the centrosymmetric image 'ISIS!' on the spine is flanked by 'Symmetry' from both directions. This convention emphasizes that *ISIS-Symmetry* and its quarterly have no direct connection with other organizations or journals which also use the word *Isis* or *ISIS*. There are more than twenty identical acronyms and more than ten such periodicals, many of which have already ceased to exist, representing various fields, including the history of science, mythology, natural philosophy, and oriental studies. *ISIS-Symmetry* has, however, some interest in the symmetry-related questions of many of these fields.

continued from inside front cover

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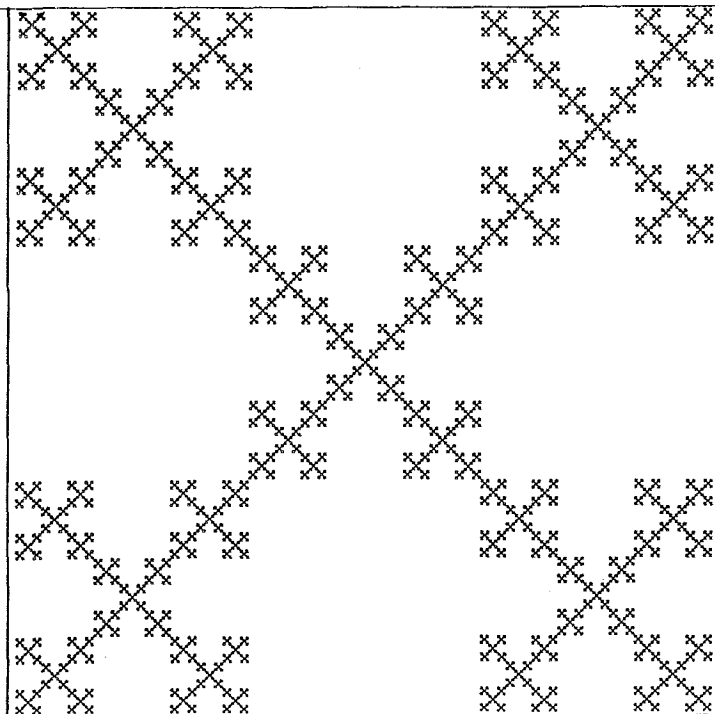
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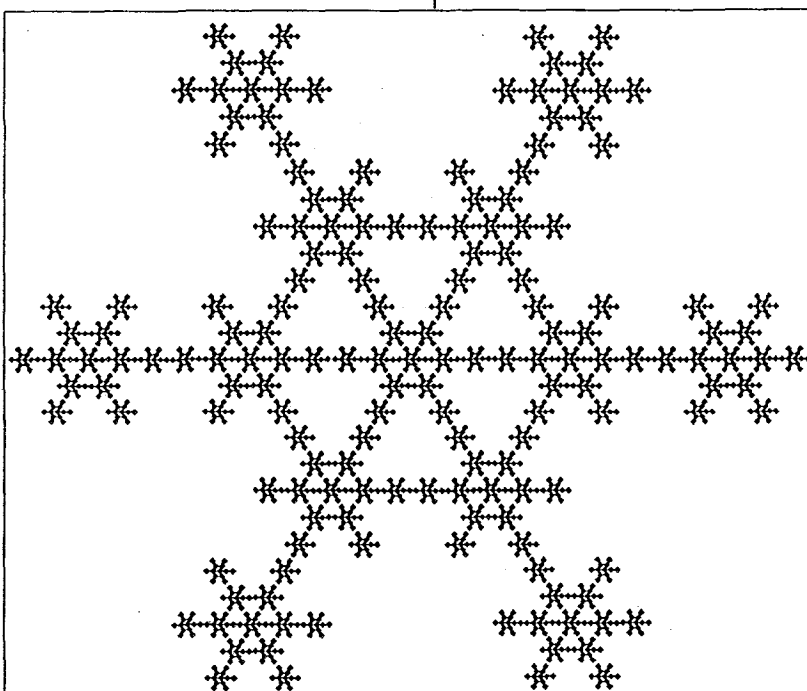
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