

## The Beauty, Dynamics, and Design of String-Patterns in Folk Arts

This special issue focuses on an interdisciplinary discussion and exchange of information concerning scientific and artistic issues in traditional cultural, ethnological, and ritual art patterns throughout the world. Folk patterns include pictures or visual designs for textile, clothes, decorations, painting, furniture and other ornamental works for decorating or representing stories. For example, there are patterns of Japanese traditional dress (Kimono) called Shippo etc., and arabesque design, or closed string patterns such as floor painting (e.g. Kolam, Tamil Nadu, South India), Celtic knot design (Europe), sand painting (Sona, Central Africa or Nitus, Vanuatu, South Pacific Oceania) or, Asian knot (Olzii-hee, Mongolian Lucky knot, various types of Chinese and Korean knots, or Mizuhiki, Japanese knot, e.g. Takara), etc.

Most of designs of the traditional patterns have geometric, periodical, cyclic, symmetrical, or recursive properties that possess rich religious or aesthetic features as well as mathematical or scientific features. These string and knot patterns have some unsolved-problems, different from the Eulerian Cycle, which are now addressed as topics in knot/link theory in mathematics.

The folk designs have been discussed recently not only as natural science, but also as anthropology or ecocriticism representing aspects of spirits or symbols of the cultures and their lands [Nagarajan], or as ethomathematics. For example, we perceive the universal flow/sprit in an infinite stroke pattern, or a return to life/resurrection in an endless-cycle pattern even in the present time. Pioneers were Prof. Profs Mr. and Mrs. Siromoney in Tamil Nadu, and Gerdes in Angola, Africa. Gerdes has discussed some common mathematical features from similar folk arts of different cultures [Gerdes].

Mathematical/graphical structures have been analyzed from the standpoint of chord diagrams [Jablan and Sazdanovic], knot theory [Ishimoto], numeric and linear diagram [Yanagisawa and Nagata], and then based on knowledge of how to draw/create such patterns with P Systems [Subramanian *et al.*], pasting schemes [Robinson], or hierarchical systems [Kishimoto and Natori], knot curves [Morita], and digitizing patterns [Nagata]. Some folk designs stimulate us to imagine their patterns expanded into the three dimensional space [Oka and Kawamoto]. Perhaps they will help advance understanding of other scientific fields, for example biological molecular structures (e.g. DNA) in future. One article discusses representation of natural phenomena, such as water flow or plants, drawn in folk art patterns [Takaki and Ueda].

These papers also discuss beauty as a factor of aesthetic appeal that comes from patterns; e.g. symmetry, periodicity, or perception of an underlying algorithm that establishes the relationships among different regions. Given of a few simple elements we can generate a huge number of patterns, only a few of these of which are special forms of symmetry etc., and have low entropy (of rare proportion)/rich meaning. The unique pattern of the swastika is rotationally-symmetric, representing meaningfully the sunbeams and dynamics of this radiation, and then mysteriousness. Even stationary patterns may make us feel dynamics in them, and we can easily get them in tracing animated images of a Kolam/Knot patterns

using computer graphics (refer <http://www.scipress.org/journals/forma/frame/22.html> of this FORMA). A study on aesthetics (sense of visual beauty)/impression in textile patterns [Goto *et al.*] is very important for understanding the artistic senses of the designers or painters of folk art patterns, or for applying them to designs of modern artworks.

Outside the strictly scientific or artistic domain, some of the papers report that these designs have practical value as industrial ornamentation, or for entertainment, education, or training of children or handicapped persons [Nagata] by means of physical artifacts or computer graphics of 3D block images [Kawai *et al.*] as well.

These papers were selected and recommended for this issue from presentations in the following conference, which was the first international trial for discussing the above themes: The International Symposium on Katachi\*/Form in Folk Art, Osaka, Japan 2006 (ISKFA06 Japan) executed by the committee (co-chairs: Mr. Nagata Shojiro, InterVision Institute, Japan, Prof. Ryuji Takaki, Kobe Design Univ., Japan, Prof. Thamburaj Robinson, Madras Christian College, India) sponsored by KASF (Kolam/Knot/Katachi Art & Science Forum), SSFJ (Society for Science on Form Japan), JSCK (Japanese Society for the Culture of Katachi/Form & Imagination), and ISTA (The Interdisciplinary Institute of Science, Technology and Art Japan) and jointly with the 62nd Autumn Symposium 2006 of the Society for Science on Form Japan, on the 3rd November 2006 in Osaka Univ. Japan.

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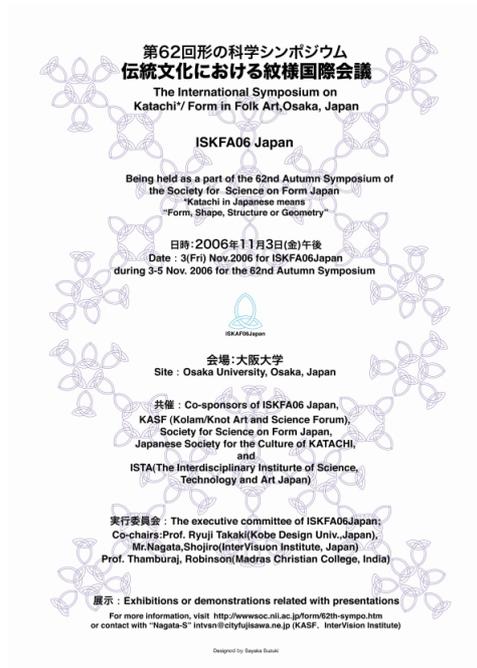
Finally, The editor hopes that this issue will stimulate additional artistic and scientific interest and research in folk arts that employ string patterns.

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Shojiro NAGATA  
The represent of KASF, and the chief of InterVision Institute  
(Chief editor of this issue)

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\*Katachi in Japanese means an integrated concept from "Form, Shape, Structure or Geometry".



The posters for ISKFA06 Osaka Japan by Inada and Awano of Tokyo Design Univ. (top) and by Suzuki and Morita of Sapporo Otani College (bottom).