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Analyzing Patterns in Oriental Carpets: Through Symmetry to the Mind of the Maker

by
Carol Bier

Typically in Oriental carpets, many patterns combine to make the whole. Within an oblong field there is often an overall repeat pattern arbitrarily cut off by borders. Field patterns cover the plane, while border patterns are linear. Patterning -- and color -- in Oriental carpets is carried by the pile (supplementary weft-wrapping) that projects from the surface of a plain weave foundation.

If we take as our definition of pattern the systematic repetition of a unit, distinctions become clear between designs and patterns. While the possibilities for designs are limitless (within the constraints of a medium), the possibilities for repeating designs to form patterns are restricted by the mathematical laws of symmetry. When viewed in two dimensions, all patterns rely upon four basic symmetries. Mathematicians call these rigid motions because they suggest movements or transformations without distortion of size or shape around a point (rotation), or along or across a line (translation; reflection; glide reflection), and to cover a plane (symmetry groups).

This presentation, to be conducted as a site seminar at The Metropolitan Museum of Art, will utilize symmetry analysis to explore the ways that weavers have combined symmetry, asymmetry, and symmetry-breaking in their creation of great works of art.

Carol Bier is Norman Frechling Visiting Professor at the University of Michigan, Ann Arbor (Fall 1998), teaching a course on "Art and Geometry: Circumscribing Patterns in Islamic Art." A specialist in textile arts of the Islamic world, Ms Bier is Curator for Eastern Hemisphere collections at The Textile Museum. She is author of *The Persian Velvets at Rosenborg* (Copenhagen, 1995), editor and contributing author of *Woven from the Soul, Spun from the Heart: Textile Arts of Safavid and Qajar Iran (16th-19th Centuries)* (Washington, 1987), and editor of *The Textile Museum Journal*. Ms Bier is currently completing a manuscript for a book on symmetry and pattern in Oriental carpets, and is author of the web teaching unit, hosted by The Math Forum at Swarthmore College, at <http://forum.swarthmore.edu/geometry/rugs/>. She also serves on the Faculty of the Maryland Institute College of Art in Baltimore.