Geometric symmetry in patterns and tilings

Clare E Horne

The Textile Institute

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WOODHEAD PUBLISHING LIMITED

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CRC Press
Boca Raton Boston New York Washington, DC

WOODHEAD PUBLISHING LIMITED
Cambridge England

Published by Woodhead Publishing Limited in association with The Textile Institute
Abington Hall, Abington
Cambridge CB1 6AH, England
www.woodhead-publishing.com

Published in North and South America by CRC Press LLC
2000 Corporate Blvd, NW
Boca Raton FL 33431, USA

First published 2000, Woodhead Publishing Ltd and CRC Press LLC

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library.

Library of Congress Cataloging in Publication Data
A catalog record for this book is available from the Library of Congress.

Woodhead Publishing ISBN 1 85573 492 3
CRC Press ISBN 0-8493-1048-2
CRC Press order number: WP1048

Cover design by The ColourStudio
Typeset by Best-set Typesetter Ltd, Hong Kong
Printed by T J International, Cornwall, England

This book is dedicated to my family.

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Foreword

Geometric Symmetry in Patterns and Tilings results from one of a series of exciting and innovative research projects emanating from the School of Textile Industries at University of Leeds.

This particular project was conducted under my supervision, and was aided by scholarship funding from the Worshipful Company of Clothworkers of the City of London. It extends the Leeds tradition of research into pattern symmetry initiated in the 1930s by H J Woods, a physicist (and mathematician), whose contribution in laying the foundations for current thinking on the geometrical characteristics of patterns is, today, widely acknowledged by scholars in the field.

Whilst many symmetry concepts have their origin in the area of crystallography, an appreciation of their usefulness has, in recent years, extended to many disciplines and realms of study. Washburn and Crowe made a major contribution in the area of anthropology in their largely pioneering work *Symmetries of Culture*. The mathematical treatise *Tilings and Patterns* by Grünbaum and Shephard stands as a major contribution to the conceptual development of the subject. *Visions of Symmetry*, Schattschneider's monumental study of the work of M C Escher, has not only stimulated an insight into the periodic drawings and patterns of the artist but has also encouraged an understanding of symmetry concepts beyond a mathematically aware audience to inspire the creation of original decorative patterns.

Recent research projects at Leeds have employed symmetry concepts in the investigation of patterns produced in a range of historical and/or cultural contexts and as a systematic means of generating printed-textile designs. Layer symmetry principles have been employed in the analysis of woven-fabric structures, and as a basis for developing a systematic means of designing woven fabrics.

The present book focuses principally on characteristics of surface-pattern design, and presents a comprehensive means of classifying patterns and tilings. A wide range of original illustrative material is included.

M A Hann,
Reader in International Textile Design
University of Leeds

Acknowledgements

This book has been developed from research activities undertaken whilst studying in the School of Textile Industries at the University of Leeds. Consequently, first I would like to express my gratitude to the School of Textile Industries, the Worshipful Company of Clothworkers, and in particular to my supervisor, Dr. M A Hann, and the Head of Department at the time, Professor D Johnson, for supporting my research.

I am also sincerely grateful to all my family and friends for their support, encouragement and understanding whilst I have been compiling this work. I would especially like to thank my family, Brenda, Tony, Christopher, Alison and Jenny. I am also greatly indebted to many friends who have shown their continual care and consideration, in particular Rachel Segal, Mark Colpus, Graham Gifford, Marion Small and Wendy Cawthray.

Finally, I would like to thank Woodhead Publishing for maintaining their interest in my work and particularly Patricia Morrison for showing such patience and support over a long period of time.