

The background of the cover is a quilted fabric with a repeating geometric pattern of large triangles and squares. Four brown paper flowers, each made of many overlapping triangular petals, are arranged in a square pattern. The title 'SHADOWFOLDS' is centered in a large, white, sans-serif font.

# SHADOWFOLDS

*Surprisingly Easy-to-Make Geometric Designs in Fabric*

JEFFREY RUTZKY AND CHRIS K. PALMER

# SHADOWFOLDS

*Surprisingly Easy-to-Make  
Geometric Designs in Fabric*

JEFFREY RUTZKY AND CHRIS K. PALMER



KODANSHA USA

► *Dedicated to Shuzo Fujimoto-sensei*

First published in North America in 2011 by

Kodansha USA, Inc.  
451 Park Ave South  
New York, New York 10016  
United States

Distributed in the United Kingdom and continental Europe by  
Kodansha Europe Ltd.

©2011 Jeffrey Rutzky and Chris K. Palmer

All rights reserved. No part of this publication may be reproduced,  
stored in a retrieval system, or transmitted in any form or by any  
means, electronic, mechanical, photocopying, recording, or otherwise,  
without the prior permission of the copyright holder.

The designs in this book are intended for personal use.  
Commercial use of any design, in print or other media, requires the  
permission of the authors.

Library of Congress Cataloging-in-Publication Data

Rutzky, Jeffrey.

Shadowfolds : surprisingly easy-to-make geometric designs in  
fabric / by Jeffrey Rutzky and Chris K. Palmer.  
p. cm.

Includes index.

ISBN 978-1-56836-379-0

1. Fabric folding. 2. Folds (Form) in art. I. Palmer, Chris K. II. Title  
TT840.F33R88 2011

736'.98—dc22

2010036978

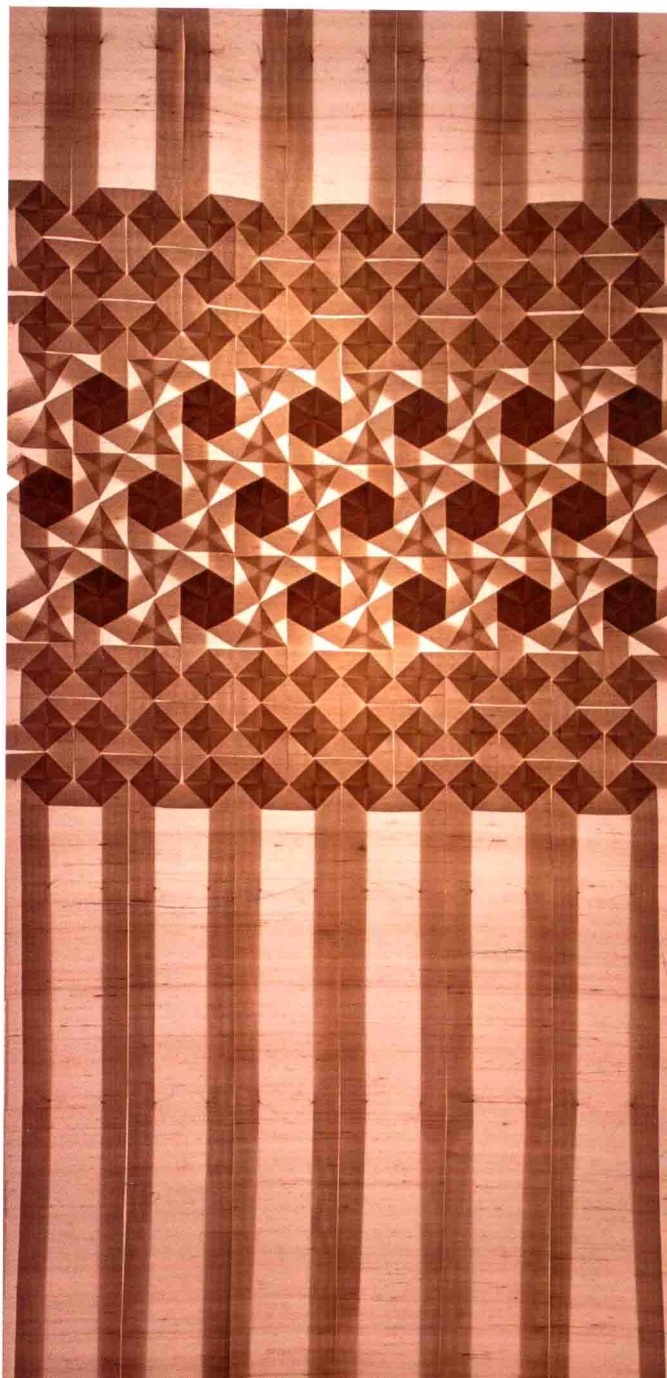
Designed by Jeffrey Rutzky

Edited by Ruth O'Brien

Shadowfold photography by Mark A. Gore and Lynne Yeamans

Manufactured in Singapore by DNP America

10 9 8 7 6 5 4 3 2





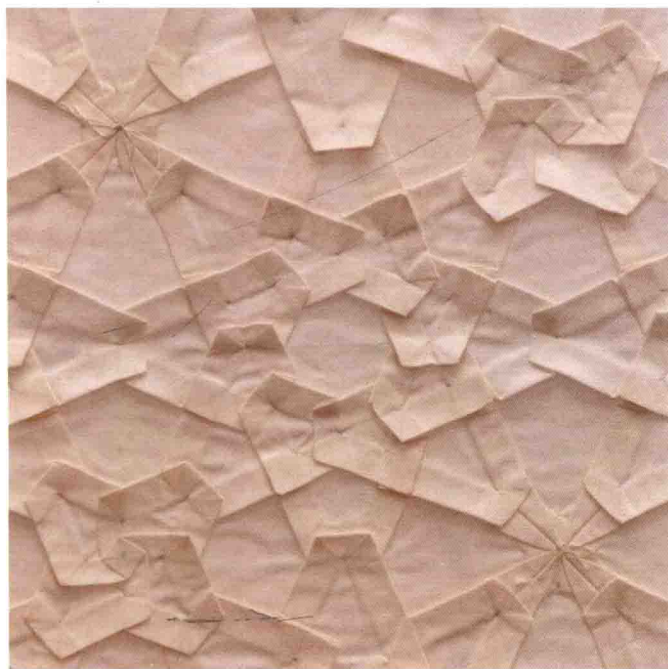
# CONTENTS

## OVERVIEW

|  |    |
|--|----|
| What are Shadowfolds? .....                      | 10 |
| Pattern and Tessellation .....                   | 11 |
| Tessellations and Traditional Craft .....        | 11 |
| The Alhambra .....                               | 12 |
| Some Properties of Geometric Tessellations ..... | 13 |
| The Father of Pleated Paper Tessellations .....  | 14 |
| Grids, Pleats, and Twists .....                  | 14 |
| Paper as the Medium .....                        | 15 |
| Cloth as the Medium .....                        | 15 |
| Folding Complex Patterns in Cloth .....          | 16 |
| Translucency of Cloth .....                      | 17 |

## APPLICATIONS

|   |    |
|---|----|
| Pleats + Translucency = Shadowfolds ..... | 18 |
| Applications of Shadowfolds .....         | 19 |
| Folds and Fashion .....                   | 20 |



## HOW TO MAKE SHADOWFOLDS

|  |    |
|--|----|
| Sew Folding Basics .....                   | 22 |
| Shadowfold Secrets .....                   | 23 |
| Techniques for Planning Shadowfolds .....  | 23 |
| Techniques for Transferring Patterns ..... | 23 |
| Techniques for Sew Folding .....           | 25 |
| Techniques for Finishing Shadowfolds ..... | 26 |
| Finding Fabric .....                       | 27 |
| Shadowfolds Care .....                     | 28 |
| Displaying Shadowfolds .....               | 29 |

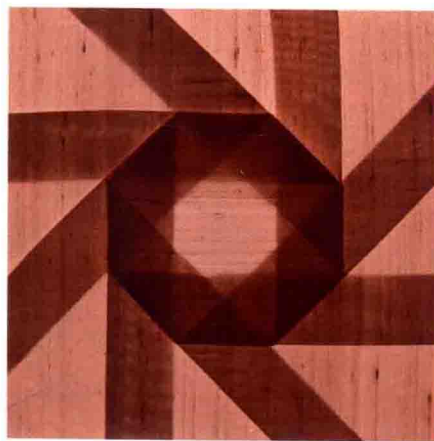
## GALLERY

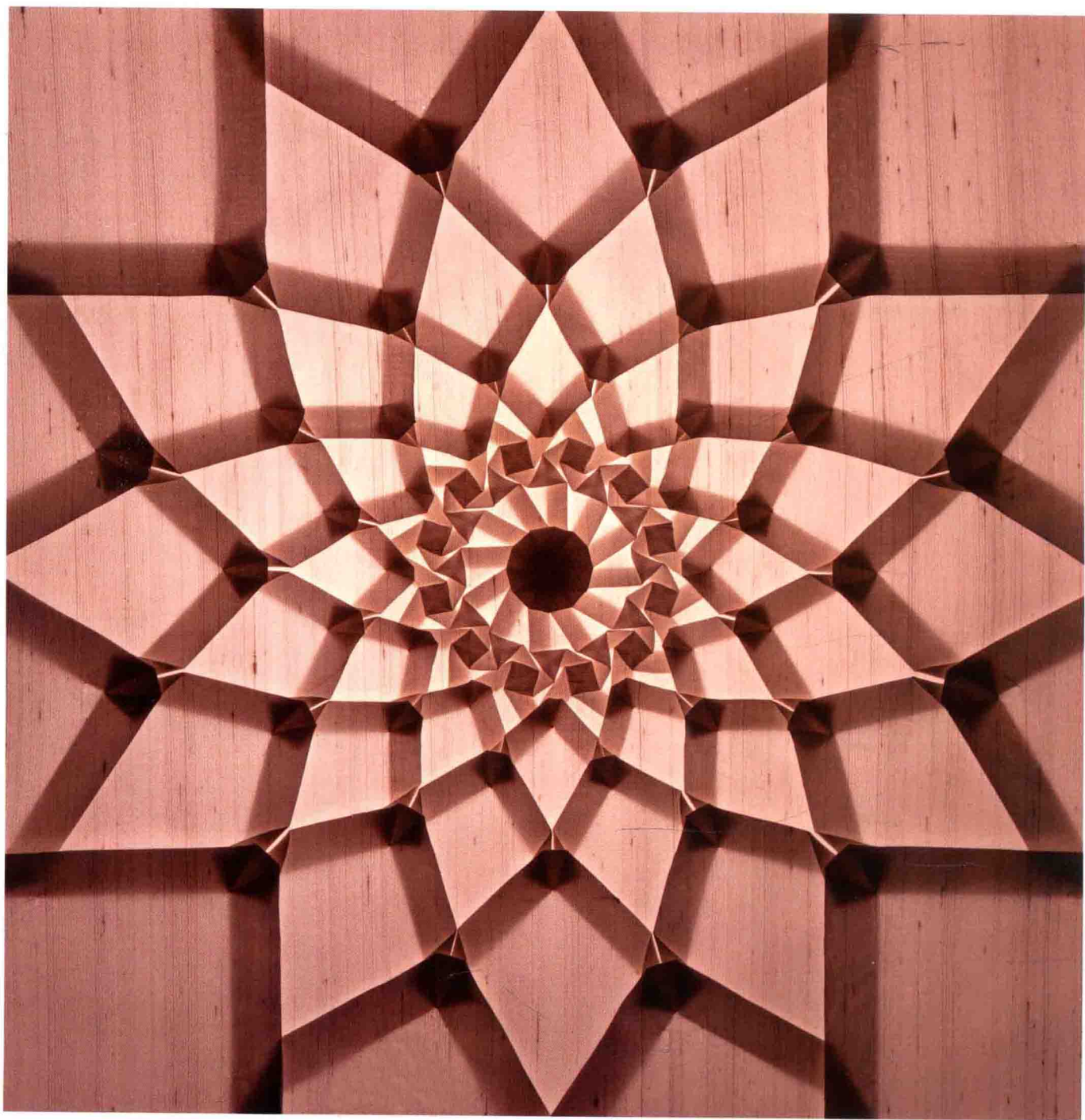
|                           |    |
|---------------------------|----|
| Shadowfolds Gallery ..... | 32 |
|---------------------------|----|

## PROJECTS

|                                |     |
|--------------------------------|-----|
| Pentagonal Star Pillow .....   | 52  |
| Fujimoto's Twists .....        | 56  |
| Octagram Book Cover .....      | 60  |
| Peace Purse .....              | 64  |
| Pinwheel Path .....            | 68  |
| Star-flower Pillbox Hat .....  | 72  |
| Twist Necktie .....            | 76  |
| Dodecagon Whirl Spools .....   | 80  |
| Octagon Bedspread .....        | 84  |
| Pinwheel Path Lamp .....       | 88  |
| Star of David Rosette .....    | 92  |
| Radiating Rosette .....        | 96  |
| Star Octagrams .....           | 100 |
| Zillij Tablecloth .....        | 104 |
| Scales Divider Screen .....    | 108 |
| Patterns .....                 | 114 |
| Resources .....                | 123 |
| Index .....                    | 125 |
| Additional Photo Credits ..... | 127 |
| Acknowledgments .....          | 128 |

# SHADOWFOLDS





# SHADOWFOLDS

*Surprisingly Easy-to-Make  
Geometric Designs in Fabric*

JEFFREY RUTZKY AND CHRIS K. PALMER



KODANSHA USA



First published in North America in 2011 by

Kodansha USA, Inc.  
451 Park Ave South  
New York, New York 10016  
United States

Distributed in the United Kingdom and continental Europe by  
Kodansha Europe Ltd.

©2011 Jeffrey Rutzky and Chris K. Palmer

All rights reserved. No part of this publication may be reproduced,  
stored in a retrieval system, or transmitted in any form or by any  
means, electronic, mechanical, photocopying, recording, or otherwise,  
without the prior permission of the copyright holder.

The designs in this book are intended for personal use.  
Commercial use of any design, in print or other media, requires the  
permission of the authors.

Library of Congress Cataloging-in-Publication Data

Rutzky, Jeffrey.

Shadowfolds : surprisingly easy-to-make geometric designs in  
fabric / by Jeffrey Rutzky and Chris K. Palmer.

p. cm.

Includes index.

ISBN 978-1-56836-379-0

1. Fabric folding. 2. Folds (Form) in art. I. Palmer, Chris K. II. Title  
TT840.F33R88 2011

736'.98—dc22

2010036978

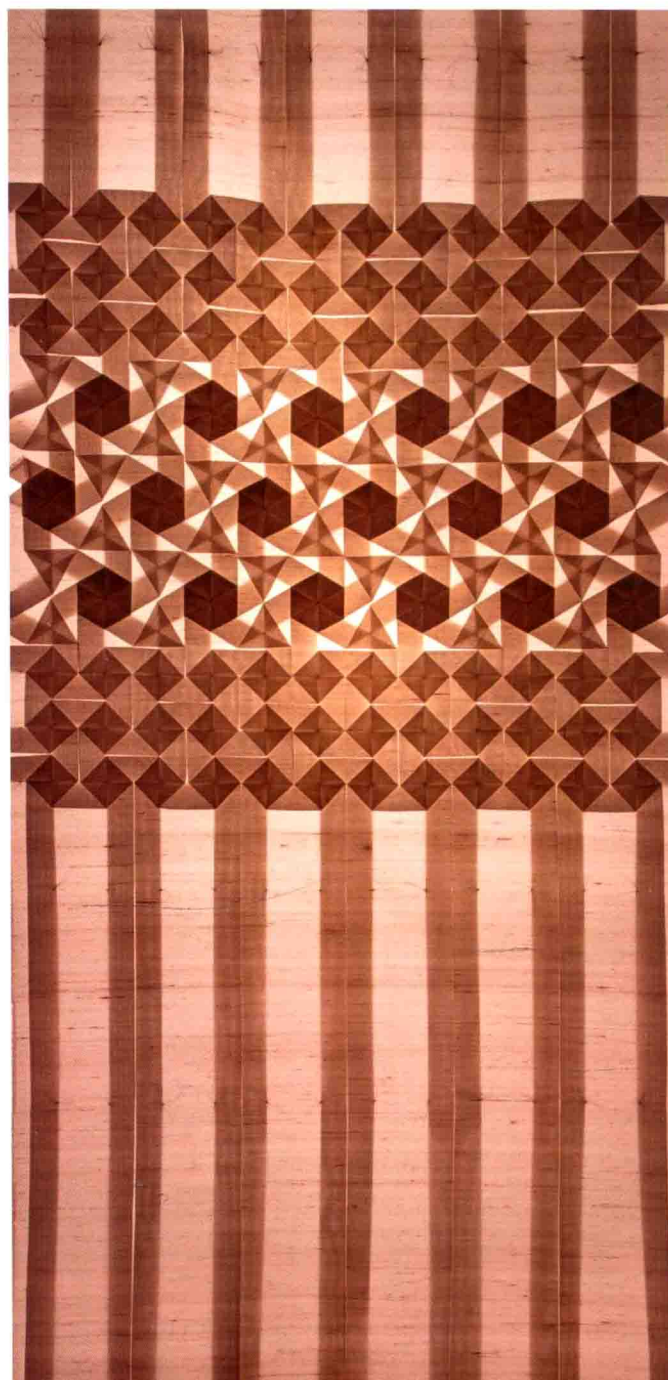
Designed by Jeffrey Rutzky

Edited by Ruth O'Brien

Shadowfold photography by Mark A. Gore and Lynne Yeamans

Manufactured in Singapore by DNP America

10 9 8 7 6 5 4 3 2





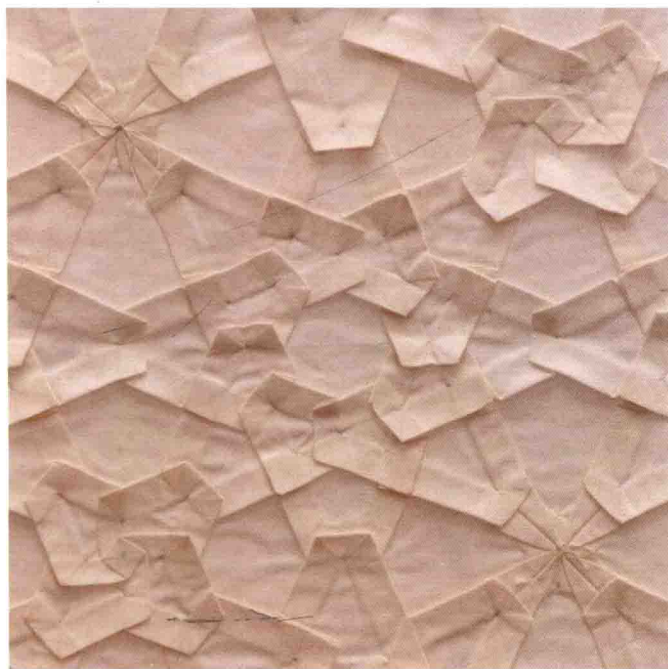
# CONTENTS

## OVERVIEW

|  |    |
|--|----|
| What are Shadowfolds? .....                      | 10 |
| Pattern and Tessellation .....                   | 11 |
| Tessellations and Traditional Craft .....        | 11 |
| The Alhambra .....                               | 12 |
| Some Properties of Geometric Tessellations ..... | 13 |
| The Father of Pleated Paper Tessellations .....  | 14 |
| Grids, Pleats, and Twists .....                  | 14 |
| Paper as the Medium .....                        | 15 |
| Cloth as the Medium .....                        | 15 |
| Folding Complex Patterns in Cloth .....          | 16 |
| Translucency of Cloth .....                      | 17 |

## APPLICATIONS

|   |    |
|---|----|
| Pleats + Translucency = Shadowfolds ..... | 18 |
| Applications of Shadowfolds .....         | 19 |
| Folds and Fashion .....                   | 20 |



## HOW TO MAKE SHADOWFOLDS

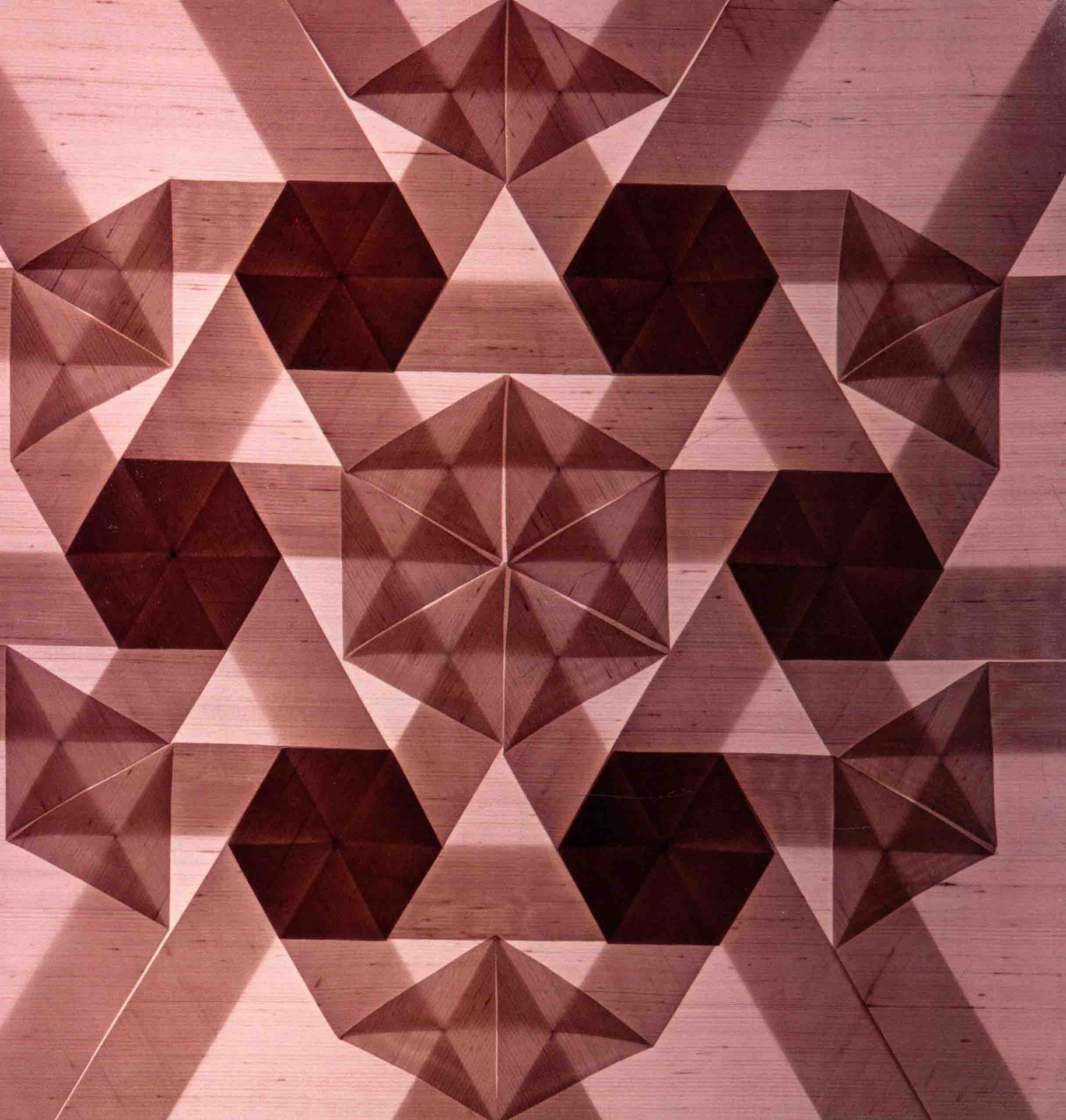
|  |    |
|--|----|
| Sew Folding Basics .....                   | 22 |
| Shadowfold Secrets .....                   | 23 |
| Techniques for Planning Shadowfolds .....  | 23 |
| Techniques for Transferring Patterns ..... | 23 |
| Techniques for Sew Folding .....           | 25 |
| Techniques for Finishing Shadowfolds ..... | 26 |
| Finding Fabric .....                       | 27 |
| Shadowfolds Care .....                     | 28 |
| Displaying Shadowfolds .....               | 29 |

## GALLERY

|                           |    |
|---------------------------|----|
| Shadowfolds Gallery ..... | 32 |
|---------------------------|----|

## PROJECTS

|                                |     |
|--------------------------------|-----|
| Pentagonal Star Pillow .....   | 52  |
| Fujimoto's Twists .....        | 56  |
| Octagram Book Cover .....      | 60  |
| Peace Purse .....              | 64  |
| Pinwheel Path .....            | 68  |
| Star-flower Pillbox Hat .....  | 72  |
| Twist Necktie .....            | 76  |
| Dodecagon Whirl Spools .....   | 80  |
| Octagon Bedspread .....        | 84  |
| Pinwheel Path Lamp .....       | 88  |
| Star of David Rosette .....    | 92  |
| Radiating Rosette .....        | 96  |
| Star Octagrams .....           | 100 |
| Zillij Tablecloth .....        | 104 |
| Scales Divider Screen .....    | 108 |
| Patterns .....                 | 114 |
| Resources .....                | 123 |
| Index .....                    | 125 |
| Additional Photo Credits ..... | 127 |
| Acknowledgments .....          | 128 |





# PREFACE

**ALL OF THE ARTWORK I MAKE INVOLVES** some form of geometry. Growing up, I enjoyed folding paper and making figures and compositions using origami. My interest grew in high school and college, with a focus on patterns and geometric design. George Bain's classic book *Celtic Art: The Methods of Construction* inspired me to draw and study traditional ornament.

After receiving my BFA, I traveled to Spain to visit Granada. I fell in love with the Alhambra and decided to live there for six months and study the tiling and elaborate mosaics left by the ancient Moors. I recorded these with hand drawings, learning to interpret the geometric language of the compositions.

I began to see ways to translate these patterns into folded paper. Examples by Tomoko Fuse inspired me to combine geometric tiling and origami. My first original compositions followed her approach of using flat unit origami of different shapes tiled together. I also wondered what it would be like to use cloth like it was paper, by starching it so it would fold similarly. Like a quilt, I fit folded cloth units together and sewed them into patterns I enjoyed.

When I was introduced to origami masters Robert Lang, Peter Engel, and Jeremy Shafer, they encouraged me to express the tilings I was studying by using a single sheet of paper. With the aid of some complex geometry, I began to understand how these repetitive patterns, known as tessellations, could be folded with one sheet.

In Japan, another origami master, Shuzo Fujimoto, was already doing this. I was so impressed with his work, I began to study the way he interpreted folds in a crease pattern. From photographs of Fujimoto's work, I learned his techniques for expressing tilings. My friendship with Jeremy Shafer led to work we created together, incorporating the tessellation principles I studied in the Alhambra.

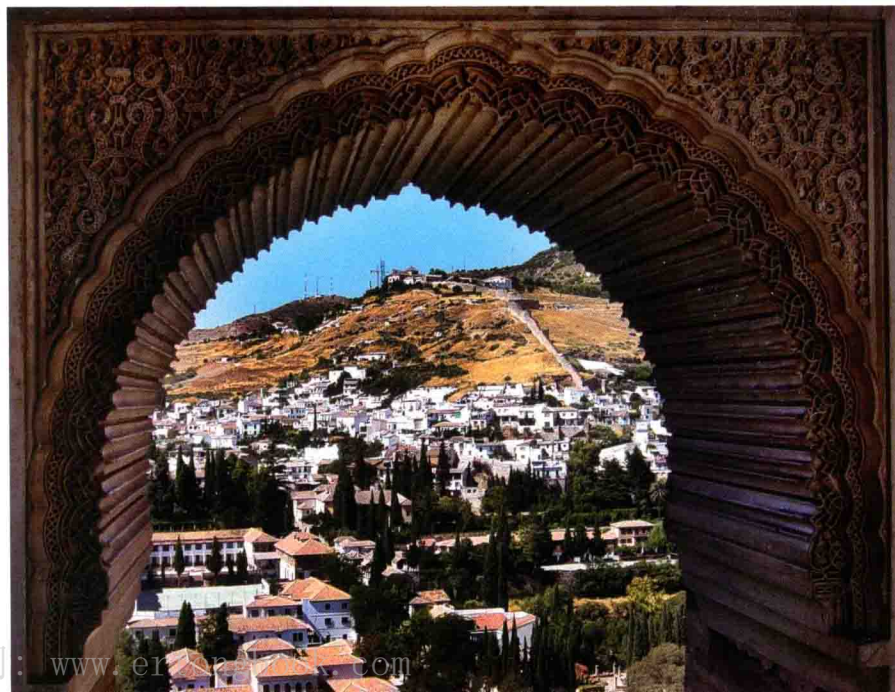
At a conference in New York City, I met Tomoko Fuse, Jun Maekawa, Toshikazu Kawasaki, and Makoto Yamaguchi. They invited me to Japan to present my work and to meet Fujimoto-sensei. His encouragement was profound, and I was grateful to have his blessing as I continued to explore his art.

I returned to my interest in using textiles for these folded works, and explored the best techniques to achieve them. I stumbled a few times while figuring out how to efficiently make such complex patterns easy to produce. Once again, I tried using starch to treat the single sheet of cloth like paper, but it was still as difficult to fold. I finally discovered a simple way of bringing common points together to create patterns without difficult manipulation. The secret was to not think of the cloth as if it were paper.

This book shares my remarkable experience of developing a technique for surprisingly easy-to-make geometric designs in fabric.

—Chris K. Palmer

▼ While studying in Granada from 1990 to 1991, I lived in a cave on this hillside at Sacromonte.

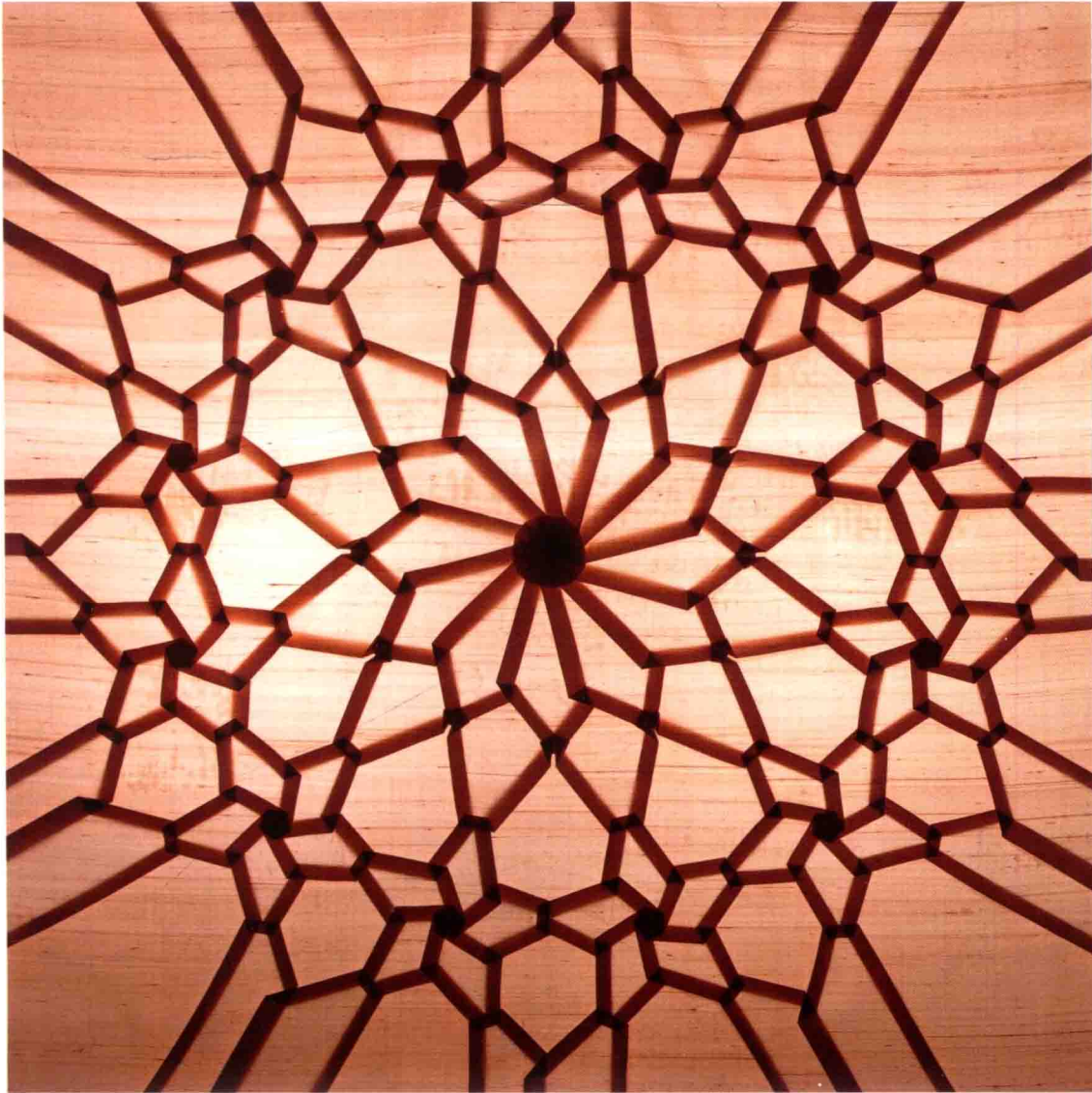








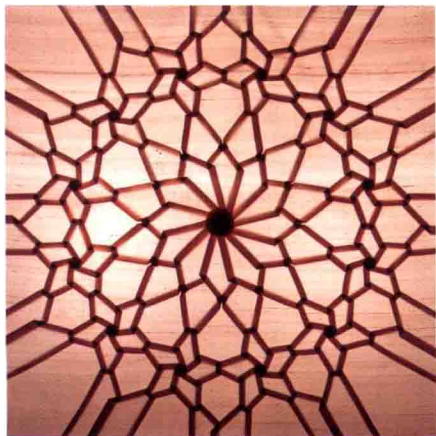
# OVERVIEW



## ► WHAT ARE SHADOWFOLDS?



Shadowfolds are works of art created by folding cloth in patterns based on classic geometric designs. The patterns, taken from traditional architecture and the interior decorations of many cultures and periods, are given an added complexity due to the way the fabric and folds interact with light. Because these geometric patterns are usually found in tiles, to make them in cloth, as Shadowfolds, lends them a soft, warm appeal. By blending traditional patterns with a contemporary style, Shadowfolds evoke a timelessness while also creating a sense of exciting innovation.



▲ Ancient mosaic from Iran, translated into a Shadowfold.

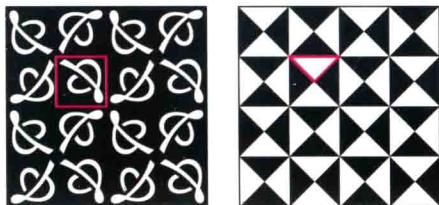
► Preliminary drawing of underlying pattern.



## PATTERN

Patterns contain elements in sets.

A motif contained in an area known as the fundamental region (shown below) is copied and placed side-by-side to cover a surface.



## TESSELLATION

The motif can be a wide variety of design elements. A special kind of motif composed of shapes placed together without gaps is called a tessellation. Familiar examples include many ancient patterns used to ornament walls, floors, and ceilings. Squares sewn together, like patches for a quilt, also form a tessellation. Tile mosaics, in particular, are made from an astounding array of shapes fitted together to form a composition. Although tessellations can have curved edges, patterns being designed with folded pleats are made of shapes with straight sides. These polygons then fit together to fill an area.

► *Tiled Torus with Changing Tiles*  
by Elaine Ellison, pieced cloth quilt,  
44½ × 44½ inches, 2009.

## TESSELLATIONS AND TRADITIONAL CRAFT

Many forms of art use pattern and tessellation to decorate and ornament, often expressing a particular style for a certain geographic region or culture. For example, rings that have repeating motifs decorate Asian pottery; Middle Eastern cultures lay thousands of ceramic tiles to assemble vast mosaics;

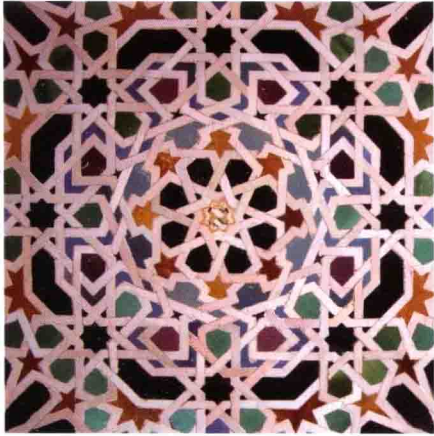
and American quilts are often pieced together with blocks of cut cloth.

The patterns also have a particular expression that is unique to each medium, based on the properties of the material, as well as the construction techniques.

Cultures throughout history use tessellations in architecture and craft. Some of the best examples of repeating

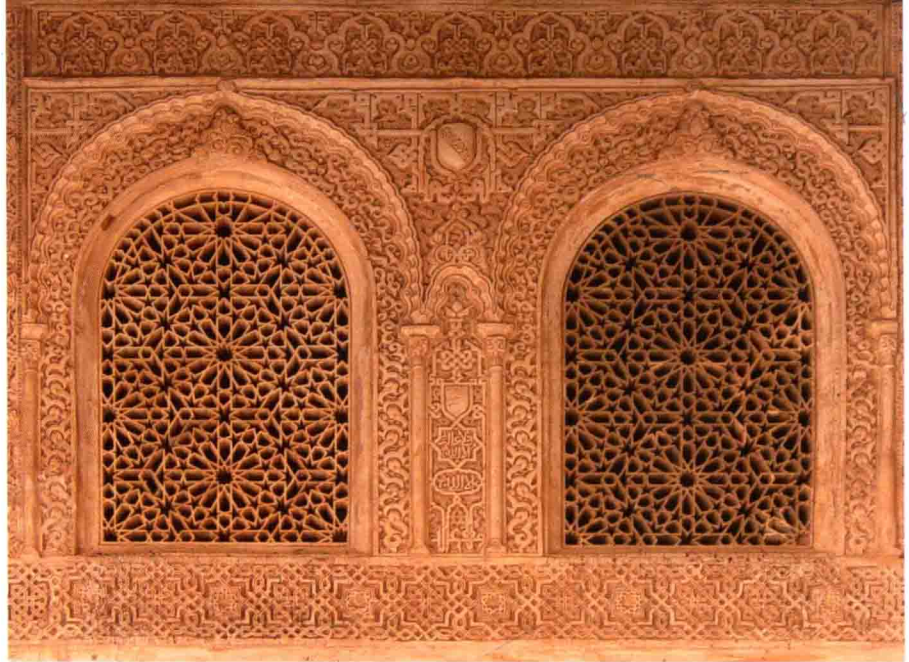






▲ Tiled mosaic, the Alhambra, c. 1300 BCE

patterns are found in mosques and palaces built in the Middle East and in southern Spain, in a region known as Andalucía. Master builders make liberal use of mosaic ornament when decorating. These include walls, ceilings, panels, screens, doors, and pavements. Artisans make rugs, pottery, and other wares, such as cups, bowls, and platters using materials such as ceramic, wood, plaster, metal, stone, and textile.



▲ Punched panels, the Alhambra, c. 1300 BCE

## THE ALHAMBRA

Andalucía is home to the city of Granada and the famous palace, the Alhambra. Built by the Moors in the 14th century, it contains some of the world's best examples of traditional tiling. The Alhambra is one of the most visited

architectural monuments in Europe. There are ornamental styles composed of floral motifs, straight-line polygons, and a blend of both. M.C. Escher visited here several times, and his famous tessellations were heavily inspired by the symmetry of the Alhambra's tiles.

▼ Wood ceiling panels, the Alhambra, c. 1300 BCE



▼ Plaster motifs, the Alhambra, c. 1300 BCE







## SOME PROPERTIES OF GEOMETRIC TESSELLATIONS

A surface with tiles that repeat is composed of two distinct parts: lines and vertices. There are an infinite number of ways to express a line. Lines made with wood shapes will be different than lines made by folding paper. The ends of each line meet to form a vertex. A vertex in plaster will be different than

pieces sewn together from cut cloth. The composition of connected lines and vertices cover a surface. A surface pattern made from ceramic tiles, for example, is opaque. However, the same underlying pattern can be translucent when folded from paper or cloth.

Translucency is the unique property that makes a Shadowfolds pattern markedly different than in other

mediums. When lines in a pattern are folded as pleats, the resultant shapes formed by the pleats become part of the artistic expression of the material. Tessellations folded this way in paper are a type of origami that is increasingly popular, though paper remains very difficult to fold this intricately.

*Pictured below are some ways artisans have expressed lines, vertices, and patterns, in six different mediums. The first row shows examples of lines. Grooves in plaster and wood can look very similar; however, others, like the tile and stone look very different.*

*When a line is expressed by pleats in paper or cloth, several thicknesses produce a shadow when light passes through. The second row shows lines that meet at a vertex. A structure forms determined by the geometry of the intersection. When pleats in paper or cloth*

*are made, these structures can expand to a greater variety of complex and beautiful forms. The third row shows tiling of lines and vertices making symmetrical forms. Some lines of symmetry spiral around a point and others are mirrored.*

▼ Ancient wood



▼ Ancient tile



▼ Ancient plaster



▼ Ancient stone



▼ Cloth quilt



▼ Pleated paper

