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"This is a new generation of CSS books for a new generation of CSS. Nobody's ever had a book like this before. Lea Verou is doing the impossible: making CSS fun to read!"

Jeffrey Zeldman, author, *Designing With Web Standards*

CSS SECRETS

BETTER SOLUTIONS
TO EVERYDAY WEB
DESIGN PROBLEMS

LEA VEROU



FOREWORD BY ERIC A. MEYER

CSS SECRETS

BETTER SOLUTIONS TO EVERYDAY WEB DESIGN PROBLEMS

In this practical guide, CSS expert Lea Verou provides 47 undocumented techniques and tips to help intermediate-to-advanced CSS developers devise elegant solutions to a wide range of everyday web design problems.

Rather than focus on design, *CSS Secrets* shows you how to solve problems with code. You'll learn how to apply Lea's analytical approach to practically every CSS problem you come across to attain DRY, maintainable, flexible, lightweight, and standards-compliant results.

Inspired by her popular talks at over 60 international web development conferences, Lea Verou provides a wealth of information for topics including:

- Background & Borders
- Shapes
- Visual Effects
- Typography
- User Experience
- Structure & Layout
- Transitions & Animations

CSS/HTML Development

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“Lea Verou is an unparalleled mind in her field, but thanks to this generous book, you too can get an insight into what it’s like to work with CSS just about anything you can think of. Even if you don’t yet know CSS, it can build your muscle. There are still countless other books waiting to be revealed!”

—Jeremy Keith
Shepherd of Unknown
Futures, Clearleft

“If you want the inside scoop on how a leading CSS expert solves, implements, practices, and some flat-out brilliance, don’t hesitate—read this book. You’ll love it!”

—Eric A. Meyer

“*CSS Secrets* is a first-class class to anyone who wants to understand how you can use CSS to help to make your website great!”

—Christopher Schmitt
Author of *CSS Cookbook*

“Lea is an exceedingly clever coder. This book is absolutely packed with clever and useful ideas even for those who know CSS well. Even better, you’ll feel more clever in your work as this book encourages us to go beyond the obvious!”

—Chris Coyier
CodePen

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Praise for *CSS Secrets*

“This is a new generation of CSS books, for a new generation of CSS. No longer a simple language tied to complicated browser hacks and workarounds, CSS is now a richly powerful and deeply complex ecosystem of over 80 W3C specifications. Nobody is better at making sense of this new CSS, and of providing design principles that help you solve problems with it, than Lea Verou—among the handful of truly amazing coders I’ve known.”

— **Jeffrey Zeldman**

author, Designing with Web Standards

“Lea Verou’s encyclopaedic mind is one of a kind, but thanks to this generous book, you too can get an insight into what it’s like to wield CSS to do just about anything you can think of. Even if you think you know CSS inside-out, I guarantee that there are still secrets in this book waiting to be revealed.”

— **Jeremy Keith**

Shepherd of Unknown Futures, Clearleft

“If you want the inside scoop on fascinating CSS techniques, smart best practices, and some flat-out brilliance, don’t hesitate—read this book. I loved it!”

— **Eric A. Meyer**

“Lea is an exceedingly clever coder. This book is absolutely packed with clever and useful ideas, even for people who know CSS well. Even better, you’ll feel more clever in your work as this book encourages pushing beyond the obvious.”

— **Chris Coyier**
CodePen

“CSS Secrets is an instant classic—so many wonderful tips and tricks you can use right away to enhance your UX designs!”

— **Christopher Schmitt**
author of CSS Cookbook

“There aren’t many books that provide as many practical techniques as Lea Verou’s CSS Secrets. Filled with dozens of solutions to common design problems, the book is a truly valuable collection of smart tips and tricks for getting things done well, and fast. Worth reading, even if you think that you know the ins and outs of CSS!”

— **Vitaly Friedman**
cofounder and editor-in-chief of Smashing Magazine

“Without fail, whenever I read something written by Lea Verou, I manage to learn something new. CSS Secrets is no different. The book is broken down into easy-to-digest chunks filled with lots of juicy bits of knowledge. While some of the book is very forward looking, there is plenty that I’ve been able to take away and apply to my own projects right away.”

— **Jonathan Snook**
web designer and developer

“Lea’s book is fantastic. She bends and contorts CSS to do things I’m pretty sure even the spec authors never imagined! You will learn multiple ways of accomplishing each graphic effect by trying out the techniques she walks through in each chapter. Later, in your work, you’ll find yourself saying, “hmm, that thing Lea did will work perfectly here!” Before you know it, your site is almost image free because your graphics are all in easy to maintain CSS components. What’s more, her techniques are fun, walking the line between practical and improbable!”

— **Nicole Sullivan**
Principal Software Engineer, creator of OOCSS

“Lea Verou’s *CSS Secrets* is useful not so much as a collection of CSS tips, but as a textbook on how to solve problems with CSS. Her in-depth explanation of the thought process behind each secret will teach you how to create your own solutions to CSS problems. And don’t miss the Introduction, which contains some must-read CSS best practices.”

— **Elika J. Etemad (aka fantasai)**

W3C CSS Working Group Invited Expert

“Lea’s presentations have long been must-see events at web development conferences around the world. A distillation of her years of experience, *CSS Secrets* provides elegant solutions for thorny web design issues, while also—and more importantly—showing how to solve problems in CSS. It’s an absolute must-read for every frontend designer and developer.”

— **Dudley Storey**

designer, developer, writer, web education specialist

“I thought I had a pretty advanced understanding of CSS, then I read Lea Verou’s book. If you want to take your CSS knowledge to the next level, this is a must-own.”

— **Ryan Seddon**

Team Lead, Zendesk

“*CSS Secrets* is by far the most technical book that I have ever read on the topic. Lea has managed to push the boundaries of a language as simple as CSS so far that you will not be able to distinguish this from magic. Definitely not a beginner’s read; it’s heavily recommended to anyone thinking they know CSS all too well.”

— **Hugo Giraudel**

frontend developer, Edenspiekermann

“I often think that CSS can seem a bit like magic: a few rules can transform your web pages from blah to beautiful. In *CSS Secrets*, Lea takes the magic to a whole new level. She is a master magician of CSS, and we get to explore that magical world along with her. I can’t count how many times I said out loud while reading this book, “That’s so cool!” The only trouble with *CSS Secrets* is that after reading it, I want to stop everything else I’m doing and play with CSS all day.”

— **Elisabeth Robson**

cofounder of WickedlySmart.com and coauthor of Head First JavaScript Programming

“CSS Secrets is a book that all web developers should have in their library. Using the information it contains you’ll learn numerous hints and tips to make CSS perform tasks you never thought possible. I was astonished at how often the author came up with simple and elegant lateral thinking solutions to problems that had bugged me for years.”

— **Robin Nixon**

web developer, online instructor, and author of several books on CSS

“As a master designer and programmer, Lea Verou’s book is as beautiful and as well thought out as her code. Whether you’re fairly new to CSS, or well versed in the intricacies of CSS3, this book has something for everyone.”

— **Estelle Weyl**

Open Web Evangelist and coauthor of CSS: The Definitive Guide

CSS SECRETS

BETTER SOLUTIONS
TO EVERYDAY WEB
DESIGN PROBLEMS

LEA VEROU

Beijing • Boston • Farnham • Sebastopol • Tokyo

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CSS Secrets

by Lea Verou

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[TI]

*In loving memory of
my mother & best friend, Maria Verou (1952–2013),
who left this world way too early.*

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Foreword

Ah, the good old days. Back in the previous millennium, we had just two CSS-capable browsers, and what they did was a fairly limited subset of a fairly limited specification, so you could fairly easily keep a complete map of what worked and what didn't in your head. That map included the bugs in each implementation, as they had many errors and oversights, some of them verging on the comical. Heck, some bugs were so fundamental that they made the browsers' layout behavior completely incompatible, forcing us to come up with a whole army of parser-bug-exploiting hacks just to work around the differences!

Wait a minute. The old days were *horrible*. Glad we're done with all that!

Things really have gotten so much better in the last several years, CSS-wise. Browsers have, for the most part, converged on compatibility, and where they are incompatible, it's nearly always because one browser doesn't support a feature that another does, as opposed to both of them trying to support the same thing differently, and usually badly. The specifications have pushed capabilities forward even as they've added features that recreate the convoluted tricks of old in much simpler, more compact ways. CSS has far more features and far more power than ever before—but, as we all know, with great power comes great complexity. It's not even a case of intentional complexity: when you combine enough working parts, no

matter how simple each may be, interesting things can and do emerge. (For more on this topic, see *The LEGO Movie*.)

But it's exactly that unintended complexity that gives CSS the ability to surprise us with emergent features we never expected, or even planned. There are secrets to be found in the intersections of properties and the bending of values. You can carve corners with gradients, animate elements, increase clickable areas, even create pie charts...and so much more. CSS has capabilities that we only dreamed of back when I was but a lad, possibilities beyond anything we imagined. It's added abilities that I once thought could never be expressed in a compact, human-readable manner—animations, to pick one example. It's advanced far enough that I'm confident there are many, many secrets yet to be discovered. Perhaps you'll discover some of them.

Until that day arrives, there are plenty of fascinating techniques that have already been unearthed, and few have done more than Lea Verou to find and share them with the world. From her blog posts to her open source contributions to her dynamic, interactive talks all over the world, Lea has amassed a formidable reserve of CSS knowledge. This book is a beautiful distillation of that knowledge. You now possess a guide to some of the most interesting, surprising, and useful techniques that CSS has yielded, a guide compiled by one of the brightest minds in the field. What Lea has prepared for you in these pages will enrich, delight, and—yes—even astonish.

Go forth, learn well, and let these discoveries be secrets no more.

—Eric A. Meyer

Preface

In the past few years, **CSS has undergone a transformation**, similar to the JavaScript revolution circa 2004. It went from being a dead-simple styling language with limited power, to a complex technology defined by **over 80 W3C specifications** (including drafts), with its own developer ecosystem, its own conferences, and its own frameworks and tooling. **CSS has grown so much that it's practically impossible for any single person to hold all of it in their brain.** Even in the W3C CSS Working Group that defines the language, nobody is an expert on every single aspect of CSS—and few even come close. Instead, most WG members focus on certain CSS specifications and might know very little about others.

Up until roughly 2009, CSS expertise was not defined by how well the language was known. This was more or less a given for any serious CSS work. Instead, CSS prowess was defined by the number of browser bugs and workarounds that had been committed to memory. Fast-forward to 2015, and browsers are now designed to support standards, and flimsy browser-specific hacks are frowned upon. There are still some unavoidable incompatibilities, but—especially because most browsers now auto-update—the pace of change is so fast, that attempting to document them in a book would be a waste of time and space.

The challenge in modern CSS has little to do with working around transient browser bugs. The challenge now is using the CSS features we have in a creative way, in order to come up with **DRY, maintainable,**

DRY is an acronym that stands for “Don’t Repeat Yourself.” It’s a popular programming mantra to promote an aspect of maintainable code: being able to change its parameters with as few edits as possible, ideally one. Emphasis on DRY CSS code is a recurring theme in this book. The opposite of DRY is **WET**, which stands for “We Enjoy Typing” or “Write Everything Twice.”

flexible, lightweight, and as much as possible, **standards-compliant solutions**. This is exactly what this book is all about.

There are many books out there that document certain CSS features from A to Z. *CSS Secrets*, for better or for worse, is not one of them. Its purpose is to fill the knowledge gaps that are left after you’ve already familiarized yourself with the reference material—to open your mind to new ways to take advantage of the features you already know about, or to let you know about useful CSS features that aren’t as shiny and popular, and that deserve more love. However, above all, the main purpose of this book is to teach you **how to solve problems with CSS**.

CSS Secrets is not a cookbook either. Each “secret” is not a canned recipe, with rigid steps you must follow to achieve a specific effect. Instead, I’ve tried to describe the thinking behind every technique in detail, as I believe that **understanding the process of finding a solution is far more valuable than the solution itself**. Even if you don’t think that a certain technique is relevant to your work, learning how to reach a solution might still prove valuable for tackling even completely different problems. Long story short, **you will hopefully get many proverbial fish from this book, but its main goal is to “feed you for a lifetime,” by teaching you how to catch them.**

Words of thanks

This book would not have been possible without the help and support of a number of fantastic people, to whom I'm deeply grateful. A big, heartfelt thank you goes to:

- All those who supported my work over the years, otherwise I wouldn't have found myself in the position of writing a book in the first place. To readers of **my blog** (*lea.verou.me*), **Twitter** (*twitter.com/Leaverou*), and elsewhere, and even more to **you**, dear reader of my first book! To everyone who has used **my open source work** (*github.com/Leaverou*) and even more to those who contributed.
- All the conference organizers who have invited me for talks and workshops over the years, especially to **Damian Wielgosik** and **Paweł Czerski** who first believed in me and invited me to the inaugural Front-Trends conference in 2010. And to **Vasilis Vassalos** who trusted me to design a web development course for Athens University of Economics and Business back in 2010, as all these experiences taught me a great deal about teaching (and a technical book is basically teaching).
- Everyone in the **CSS Working Group** who voted to bring me on as an Invited Expert, which has transformed my perspective on web technologies in general and on CSS in particular.

-
- My editors, **Mary Treseler** and **Meg Foley**, who gave me control over the entire process and have been incredibly patient with me when I missed deadlines (which happened more often than I'd care to admit).
 - My production editor, **Kara Ebrahim**, who spent copious amounts of time fixing layout issues and manually compensating for CSS rendering bugs and limitations in the PDF renderer used for this book.
 - My technical editors: **Elika Etemad**, **Tab Atkins**, **Ryan Seddon**, **Elisabeth Robson**, **Ben Henick**, **Robin Nixon**, and **Hugo Giraudel**. They not only helped me correct factual mistakes, but also provided invaluable feedback regarding the understandability of the prose.
 - **Eric Meyer**, who I still cannot believe agreed to write a Foreword for my book.
 - My research advisor, **David Karger**, who was extremely understanding when I arrived at MIT without having finished this book, which was supposed to be done long before then. Without his continued patience, the fate of this book would have been bleak.
 - My dad, **Miltiades Komvoutis**, who taught me art and aesthetics very early on. Without him, I would probably have zero interest in design and CSS, and this book would have been about something else, like C++ or kernel programming.
 - My uncle/second dad, **Stratis Veros**, and his lovely wife, **Maria Brere**, who put up with me when I was at my most cranky while writing this book. Also to their kids, **Leonie** and **Phoebe**, who are the cutest little girls in the world and without whom, this book would have finished around a month earlier.
 - My incredible late mother, **Maria Verou**, to whom this book is dedicated. For the 27 years our lives overlapped, she was my best friend and biggest supporter. Her own life was a huge inspiration: she moved to the other side of the world to do postgraduate research at MIT in the 1970s, a time when most women in Greece barely made it to college, and got her degree with distinction. She taught me ambition, kindness, integrity, independence, open-mindedness. But most importantly, she taught me to not take life too seriously. I miss her sorely.

Photo credits

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Making of

This is a book that eats its own dog food, proverbially speaking. It was **written in clean HTML5**, with a few **data-** attributes, defined by O'Reilly's **HTMLBook standard** (oreillymedia.github.io/HTMLBook). This means that everything you see in this book—the layout, the figures, the colors—is **HTML styled with CSS**. A lot of the figures are also generated with **SVG** or use SVG data URIs, generated via SCSS functions. The few math formulas were written in **LaTeX** and then converted to **MathML** behind the scenes. You may find it amusing that the page numbers, chapter numbers, and secret numbers are merely CSS counters.

Many of the books O'Reilly publishes these days are made that way. They have built a system especially for this purpose, called **Atlas** (atlas.oreilly.com). The best thing about Atlas is that it's also available for the public, not just for official O'Reilly use.

However, this book was not a typical Atlas use case. It pushed the limits of what is possible today with CSS for printing, in a way that—to my knowledge—no other book has. It helped us find many bugs in Atlas and Antenna House (the PDF renderer used by Atlas) and even many issues with the print-related CSS specifications themselves, which I took to the CSS WG.

"How much code does it take to make a book like this with web technologies?" you might ask. Let's look at a few statistics (before production):

- This book is styled with **4,700** lines of SCSS, compiling to **3,800** lines of CSS.
- A little over **10,000** lines of HTML.

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