

Wiley Trading Series

**A GUIDE TO CREATING
A SUCCESSFUL ALGORITHMIC
TRADING
STRATEGY**

PERRY J. KAUFMAN

WILEY

A Guide to Creating a Successful Algorithmic Trading Strategy

PERRY J. KAUFMAN

WILEY

Cover image: Top: © Raimundas/Shutterstock; Bottom: © argus /Shutterstock
Cover design: Wiley

Copyright © 2016 by Perry J Kaufman. All rights reserved.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

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, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600, or on the Web at www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at www.wiley.com/go/permissions.

Limit of Liability/Disclaimer of Warranty: While the publisher and author have used their best efforts in preparing this book, they make no representations or warranties with respect to the accuracy or completeness of the contents of this book and specifically disclaim any implied warranties of merchantability or fitness for a particular purpose. No warranty may be created or extended by sales representatives or written sales materials. The advice and strategies contained herein may not be suitable for your situation. You should consult with a professional where appropriate. Neither the publisher nor author shall be liable for any loss of profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages.

For general information on our other products and services or for technical support, please contact our Customer Care Department within the United States at (800) 762-2974, outside the United States at (317) 572-3993, or fax (317) 572-4002.

Wiley publishes in a variety of print and electronic formats and by print-on-demand. Some material included with standard print versions of this book may not be included in e-books or in print-on-demand. If this book refers to media such as a CD or DVD that is not included in the version you purchased, you may download this material at <http://booksupport.wiley.com>. For more information about Wiley products, visit www.wiley.com.

ISBN 978-1-119-22474-7 (Hardcover)
ISBN 978-1-119-22476-1 (ePDF)
ISBN 978-1-119-22475-4 (ePub)

Printed in the United States of America.
10 9 8 7 6 5 4 3 2 1

A Guide to Creating a Successful Algorithmic Trading Strategy

The Wiley Trading series features books by traders who have survived the market's ever changing temperament and have prospered—some by reinventing systems, others by getting back to basics. Whether a novice trader, professional or somewhere in-between, these books will provide the advice and strategies needed to prosper today and well into the future. For more on this series, visit our website at www.WileyTrading.com.

Founded in 1807, John Wiley & Sons is the oldest independent publishing company in the United States. With offices in North America, Europe, Australia and Asia, Wiley is globally committed to developing and marketing print and electronic products and services for our customers' professional and personal knowledge and understanding.

Acknowledgments

My special thanks to three people with incredible knowledge in this area, and who could have easily written this themselves, John Kowalik, John Ehlers, and Linda Raschke. They generously provided very extensive and insightful comments that resulted in numerous changes and hopefully, considerably more clarity. My appreciation also goes to Mark Rzepczynski, who tenaciously questioned some of my conclusions and to Ernie Varitimos and Murray Ruggiero for their insight.

To my mother, Helen, who has proofread every book that I've written. If you find any errors, please direct your comments to her.

Thank you all.

PJK

* * *

A reminder from Barbara Rockefeller's Morning Forex Briefing:

The researches of many commentators have already thrown much darkness on this subject, and it is probable that if they continue we shall soon know nothing at all.

—Mark Twain

Contents

| | |
|------------------------|-----------|
| Acknowledgments | xi |
|------------------------|-----------|

CHAPTER 1

| | |
|---|----------|
| A Brief Introduction: The Ground Rules | 1 |
| My Objective | 2 |
| The Ground Rules | 3 |
| The Process | 3 |
| Basic Trading Systems | 6 |

CHAPTER 2

| | |
|--|----------|
| The Idea | 9 |
| Begin at the Beginning | 9 |
| The Idea Must Match Your Trading Personality | 11 |
| I Need a Fast Payout | 12 |
| Withstanding the Test of Time | 13 |

CHAPTER 3

| | |
|---|-----------|
| Don't Make It Complex | 15 |
| A Word about Noise | 17 |
| Integrated Solutions versus Building Blocks | 18 |
| More Rules, Fewer Opportunities, Less Success | 19 |

CHAPTER 4

| | |
|---|-----------|
| Why Should I Care about "Robust" | |
| If I'm Trading Only Apple? | 21 |
| Is It Robust? | 22 |
| Another Dimension | 25 |

| | |
|--|----|
| But Which Parameter Value Do I Trade? | 27 |
| Multiple Time Frames | 28 |
| Is One Trend Method Better Than Another? | 29 |

CHAPTER 5

| | |
|---|-----------|
| Less Is More | 33 |
| Volatility Cuts Both Ways | 34 |
| Bull Markets Happen When Everyone Is in Denial | 36 |

CHAPTER 6

| | |
|---|-----------|
| If You're a Trend Follower, Don't Use Profit-Taking or Stops | 39 |
| The Dynamics of a Trend Strategy | 42 |
| It's Getting Harder to Find the Trend | 42 |
| The Eurodollar Trend | 43 |
| Where Do You Place Your Stop? | 45 |
| What about Profit-Taking? | 46 |
| Entering on a Pullback | 47 |
| Which Is the Best Trend-Following Method? | 48 |

CHAPTER 7

| | |
|---|-----------|
| Take Your Profit If You're a Short-Term Trader | 51 |
| What's Bad for the Trend Is Good for the Short-Term Trader | 53 |
| If You Can't Use Stops for Trend Following, Can You Use Them for Short-Term Trading? | 55 |
| There Are Always Exceptions | 56 |

CHAPTER 8

| | |
|--|-----------|
| Searching for the Perfect System | 59 |
| Looking at the Results | 61 |
| How Much Data and How Many Trades Are Enough? | 62 |
| So, Which Parameter Value Do I Pick? | 63 |

CHAPTER 9

| | |
|---|-----------|
| Equal Opportunity Trading | 65 |
| Calculating Position Size | 66 |
| Avoid Low-Priced Stocks | 66 |
| True Volatility-Adjusting Doesn't Work for a Portfolio of Stocks | 67 |
| Risk in Futures | 67 |
| Target Risk | 68 |
| Calculate the Rate of Return for the Portfolio | 69 |
| Assigning Risk to Your Portfolio | 72 |
| Multiple Strategies Are More Important | 73 |
| Not So Easy for the Institutions | 75 |
| Too Much of a Good Thing Can Be Bad | 75 |

CHAPTER 10

| | |
|-------------------------------------|-----------|
| Testing—The Fork in the Road | 79 |
| Let the Computer Solve It for You | 81 |
| How Do You Evaluate the Results? | 83 |
| What's Feedback? | 84 |
| Hidden Danger | 86 |
| Forgotten History | 86 |
| Use True Costs | 87 |

| | |
|--|------------|
| Use Dirty Data | 89 |
| Back-Adjusted and Split-Adjusted Data | 91 |
| The Different Performance Measures | 92 |
| Interpreting the Ratio | 92 |
| Not Everyone Uses the Information Ratio | 93 |
| Number of Trades | 94 |
| Expectations | 94 |
| CHAPTER 11 | |
| Beating It into Submission | 97 |
| Fixing Losing Periods | 97 |
| Use the Average Results | 99 |
| Squeezing the Life Out of a System | 101 |
| Generalizing the Rules | 105 |
| CHAPTER 12 | |
| More on Futures | 107 |
| Leverage | 108 |
| Conversion Factors for Calculating Returns | 109 |
| Don't Forget FX | 110 |
| FX Quotes | 111 |
| Real Diversification | 113 |
| The Life Cycle of a Commodity Market | 115 |
| CHAPTER 13 | |
| I Don't Want No Stinkin' Risk | 117 |
| A Clear Plan | 119 |
| Avoid Low-Priced Stocks | 120 |
| Volatility Over 100%? | 121 |
| Don't Trade When Volatility Is Very High | 122 |

| | |
|---------------------------|-----|
| Sidestepping Price Shocks | 122 |
| Portfolio Drawdown | 123 |
| Business Risk | 124 |
| Gearing Back Up | 125 |

CHAPTER 14

Picking the Best Stocks (and Futures Markets) for Your Portfolio

127

| | |
|------------------------|-----|
| Asking Too Much | 127 |
| The Practical Solution | 128 |
| Ranking Success | 130 |
| Rotation | 132 |

CHAPTER 15

Matching the Strategy to the Market

133

| | |
|-------------------|-----|
| Noise for Stocks | 134 |
| Noise for ETFs | 136 |
| Noise for Futures | 136 |

CHAPTER 16

Constructing a Trend Strategy

139

| | |
|--------------------------------|-----|
| The Trend | 140 |
| Buying and Selling Rules | 141 |
| First Tests | 141 |
| Costs | 143 |
| Expectations | 143 |
| Satisfying the First Milestone | 144 |
| Profit-Taking | 146 |
| Volatility Filter | 148 |
| Combining Rules | 149 |

| | |
|-------------------------------|-----|
| Multiple Entries and Exits | 150 |
| More Markets, More Robustness | 151 |
| Stabilizing the Risk | 152 |
| Do It Yourself | 153 |

CHAPTER 17

Constructing an Intraday Trading Strategy 155

| | |
|--------------------------------------|-----|
| The Time Frame | 156 |
| Outline | 157 |
| Deciding on the Strategy | 158 |
| Choosing a Strategy | 158 |
| Directional or Mean Reverting | 159 |
| The Basic Rules | 160 |
| The Breakout Rule | 161 |
| Profit Taking and Extreme Volatility | 162 |
| What About the Trend? | 163 |

CHAPTER 18

Summary 167

Resources 169

| | |
|------------------------------|-----|
| System Development Platforms | 169 |
| Blogs | 170 |
| Periodicals | 171 |
| Perry Kaufman Websites | 172 |

Index 173

CHAPTER 1

A Brief Introduction: The Ground Rules

*Everything should be made as simple as possible,
but not simpler.*

—Albert Einstein

If you haven't heard it, a classic example of trading experience is the difference between a statistician and a trader. You flip a coin 99 times and it comes up heads each time. You ask the statistician, "What are the odds that it will come up heads next time?" The statistician answers, "50:50." You ask the trader the same question and he answers, "100 percent." Surprised, you ask the trader, "Why?" He responds, "Because it couldn't possibly be a fair coin. The odds of getting 99 heads in a row are too high to have happened by chance." Experience transforms theory into reality.

When I first started trading using automated systems in the early 1970s, the very idea was demeaned by professional traders as “ridiculous,” “the market just doesn’t work that way,” “you can’t make money if you don’t know the value of the stock.” Now that opinion seems to have been turned upside down. High frequency trading, the algorithmic trading system on steroids, has “an unfair advantage,” “it’s stealing money from the ordinary investor.” Times have changed, but attitudes have not.

MY OBJECTIVE

This is a no-frills book. It’s short because it just deals with the most important issues of developing a successful trading system and because you’re more likely to read it all. It is intended to be a painless lesson in reality, those critical steps that you learn over time, often by doing them wrong. For some, it will be a confirmation that you’re getting it right, and for others it may be an “Aha!” moment. It would be more responsible, and more scientific, to verify each of my conclusions yourself. But, if you’re like me, you readily accept ideas that are reasonable and seem right, and you choose to believe them. I’ve been uncertain at times, but I rarely regret a decision that comes from common sense.

Each chapter contains, in my opinion, the best way to deal with the various aspects of creating a trading system. All of the steps are important, and doing them incorrectly will show up later in your trading account, perhaps too late. It’s better to spend a little extra time up front to increase your chances of success later on.

THE GROUND RULES

Before we get immersed in the details, there are some important items to define and disclose.

First, we all have biases. They are often found in what we don't say rather than what we actually state. I see that when I watch the political commentary on television and also in the evening news. Everyone seems to have an agenda.

My own biases are toward fully automatic trading, which include all the good and bad of it. I also like macrotrend systems, stock and various other arbitrage, and some pattern recognition, among other methods that I can't remember right now. I don't like systems with a lot of rules and I'm suspicious of systems that work on only one market. I'm going to try to balance my examples to show short-term and long-term systems, but the reality is that there will probably be more about long-term trend following, which I believe is used by more traders, especially at the early stages when they are dangling their collective toes in the water.

THE PROCESS

The process of developing a trading strategy involves eight well-defined steps, shown in Figure 1.1. These should be clear, except for the marks on the left that show "Change rules" and "Failed." From the top down, the trading idea comes first, then you need to get all the data that will be used to validate your strategy. You must have a trading platform to test your idea, which could be as simple as Excel, or as sophisticated as TradeStation. You enter your rules using that platform.

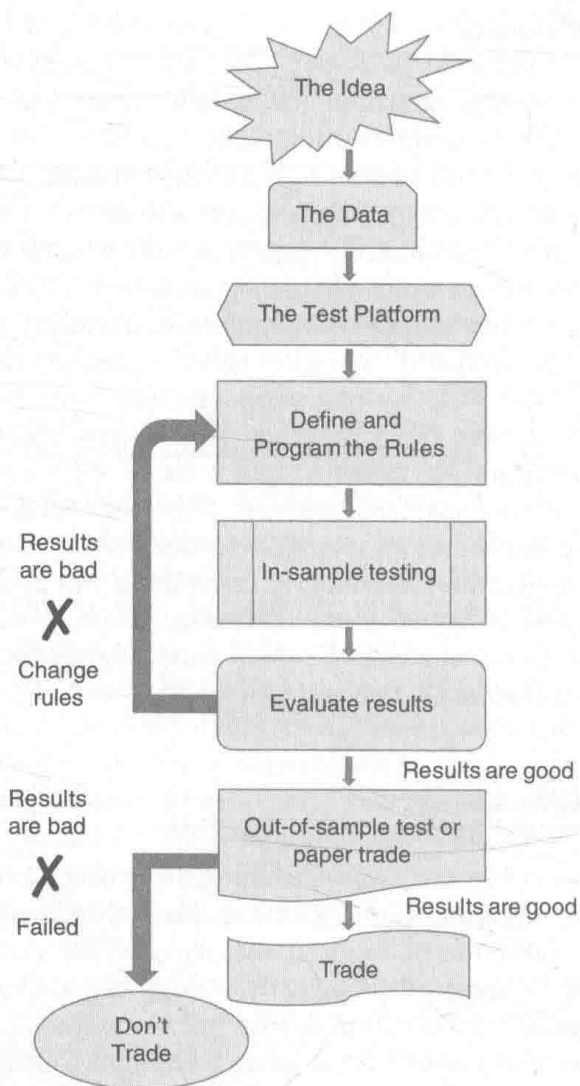


FIGURE 1.1 The Development Process

You begin testing using in-sample data (more about this in Chapters 10 and 11) and evaluate the results. If they are not what you want, go back and change the rules, then retest them using the in-sample data. Continue to do this until you're satisfied with the results. Then test the strategy on out-of-sample data, which you've held aside and not used. If it works, and we'll explain what "works" means later, you're ready to trade.

However, it doesn't usually unfold that smoothly. When you use the out-of-sample data, the results are not as good as you expected. So you go back and change the rules. But now you no longer have the out-of-sample data that are needed to verify your work. Purists would say that, once you fail the out-of-sample test, then you need to discard the system and start with something new. But that never actually happens. We're sure that the method still works, but we've overlooked something that now seems obvious, such as using volatility instead of fixed values for placing the stop-loss. Or, we should have added profit-taking.

There is a way out. When you're all done testing and the results finally look good, you can paper trade. That way, you track the results with no money and see if they are close to your expectations. The problem is that it takes time and we're usually impatient to make money—or in some cases, to lose money. Experience says that there are probably still changes to be made, so paper trading is your punishment for looking at the out-of-sample data more than once.