Encyclopedia of Candlestick Charts

Thomas N. Bulkowski

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Encyclopedia
of
Candlestick Charts

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*Twenty years ago, **Susan Blackburn** came to my aid after a car accident. She helped smooth the runway that would be my future. She is a priceless treasure, a dear friend.*

*Six years ago, **Barbara Rockefeller** was the wind beneath my wings, carrying me aloft. An incalculable amount of my publishing success I owe to her.*

These two women are the engines that have kept my airplane moving forward, and to them I dedicate this book.

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Preface

Let me tell you a story. Over a decade ago, I was playing with a stock market program I wrote and decided to see if I could get candlesticks to display. I knew it was possible, because the company that wrote the charting module said so. They just didn't tell me how to do it. I read the manual written by someone for whom English was a second language and then struggled with programming the darn thing for countless hours with no success. I gave up.

Several years later, I tried again. This time I stumbled upon the right combination of elements to get the charting module to work. I drew my first candlestick.

The excitement I felt was not like riding the world's fastest roller coaster but more like learning that the stock you purchased yesterday will be taken over for a 40% premium. I scared my dog with a little cheering, which was followed by a warm fuzzy feeling that pervaded my body.

It took less than an hour for me to fall in love with candles.

I used my charting discovery and incorporated it into another program called Patternz that recognizes all of the candles in this book and provides performance tips. It's available free at my web site: ThePatternSite.com.

In helping a friend analyze the stock market, I would send the candle tips Patternz provides and added my own two cents. "This is a bearish engulfing candle, so that means price is likely to close lower tomorrow," I wrote in an e-mail. The stock turned into a fireworks display as it exploded upward. This happened not just once but practically every time I tried depending on candles to help determine future performance.

The more I used candles, the more I grew to distrust them. They just didn't work as advertised. "Here's a hanging man with overhead resistance set up by a rising window with prior minor highs and lows blocking price movement. That means price will go down in the coming days." The stock became a moon shot.

I had already read half a dozen candle books and pored over Internet sites to develop my Patternz program. The sources I checked couldn't even agree on candlestick configuration. Take an inverted hammer. One Internet site said, "The upper shadow should be *at least* two times the length of the body." Another site said, "The upper shadow is *no more than* two times as long as the body." Is a shooting star a single candle line or two? The answer depends on which source you check. I found a spelling error for one candle pattern duplicated letter for letter on at least two other web sites.

I decided to do my own research to find out how candles worked, and the result is this book. I didn't write this book for the money. I didn't write it to achieve fame or glory. I wrote it because I need this information to trade better. Candlesticks can help you do that, but only if you know what to look for, learn how they work, and understand the trading setups that bring out the best performance. This book covers all that and more.

If you've ever felt frustrated with candlestick performance or just want to learn how they behave, then this book is for you. No other book covers all of the candlesticks and includes statistical performance data for both bull and bear markets in an easy-to-understand format, as this one does.

Whether you're a novice trader or an experienced hedge fund manager, you can profit from this book. For a quick sample, read Chapter 1, "Findings." There I discuss the many discoveries I uncovered along the way. That chapter alone is worth more to your bank account than the cost of this book.

Use this book as a reference work. Don't try to read it from cover to cover. In the writing and publishing process, I'll have to do that several times, so I know what I'm talking about. I've taken liberties to keep the text lively, just in case.

Most candle chapters follow the same format, so once you become accustomed to the layout, everything will become familiar. A "Glossary and Methodology" chapter at the end of the book explains each table entry in detail and defines terms. Back there you'll also find a visual index with little pictures of all the candles to make recognition easier.

Here's a brief snapshot of the good stuff I cover for over 100 candle patterns:

- Identification guidelines describe what to look for.
- General statistics include performance over time and where performance is best in the yearly price range.
- Height statistics explore the performance of tall versus short candles, tall or short shadows, and a measure rule to help set price targets.
- Additional statistics look at volume trend, average volume, and breakout volume.
- The reversal rates table covers three methods of confirmation to detect reversals, the likely breakout direction based on the existing price trend, and where reversals or continuations are most likely to appear in the yearly price range.

- Performance indicators describe which of three entry methods give the best trading signals, how a 50-day moving average can help improve performance, and whether the position of the closing price indicates better performance.
- All statistics cover both bull and bear markets using more than 4.7 million candle lines in the research.

The tested performance of a surprising number of candles is opposite popular belief. Many candlesticks perform little better than randomly. Others are so rare that you may see only one in a lifetime—if you are lucky. But don't take my word for it. Do your own research and form your own conclusions. That's the real way to learn about candlesticks. Or you can save yourself the work and just buy this book.

THOMAS N. BULKOWSKI
June 2007

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Good eggs, all.

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Introduction

The candlestick trade I'm about to describe made me enough money to pay for three months of living expenses. That's not bad for an hour's work! In a moment, I'll outline the trading setup so you can tailor it to your liking.

On May 16, 2007, I went shopping for a stock to buy and found one in the diversified chemicals aisle of the market. What caught my eye first was a consolidation pattern called a descending triangle. Figure I.1 shows the chart pattern in May. Descending triangles have a flat bottom and a downward-sloping top. They break out downward 64% of the time, but upward breakouts can post spectacular results. I was looking for an upward breakout.

The next pattern I noticed was the Big W. A tall left side (C to A) leads to a reversal pattern, such as the Eve & Eve double bottom AB. Eve bottoms are wide, rounded turns, unlike Adam bottoms, which are narrow, often pointed—a single spike or two wide. Eve can have spikes like that shown at B, but the spikes are shorter and more numerous than what you see on Adam. The Eve & Eve double bottom is one of the more powerful and successful chart patterns. The theory behind a Big W is that the right side will mimic the left and price will climb after that.

The pattern that sealed the deal was the morning doji star candlestick. That candle pattern ended the day that price closed above the top of the descending triangle. My research said that the morning doji star is a highly reliable candle formation. Combined with additional analysis I did on the company, both fundamental and technical, the stock was a buy only if it gapped open higher. Why? Because the next day the company was holding a conference call before the market opened to discuss earnings. A higher open would mean the market liked its story.

The news reports the night before the meeting said that net profit was 53 cents versus 61 cents during the year-ago quarter even as revenue climbed by 30%. Just 1% of the revenue gain was from higher internal sales, though. Most was from acquisitions or currency translation. Analyst estimates ranged from \$0.52 to \$0.58, so earnings came in at the low end. All of this sounded bearish to me, but the technicals were shouting, "Buy!"

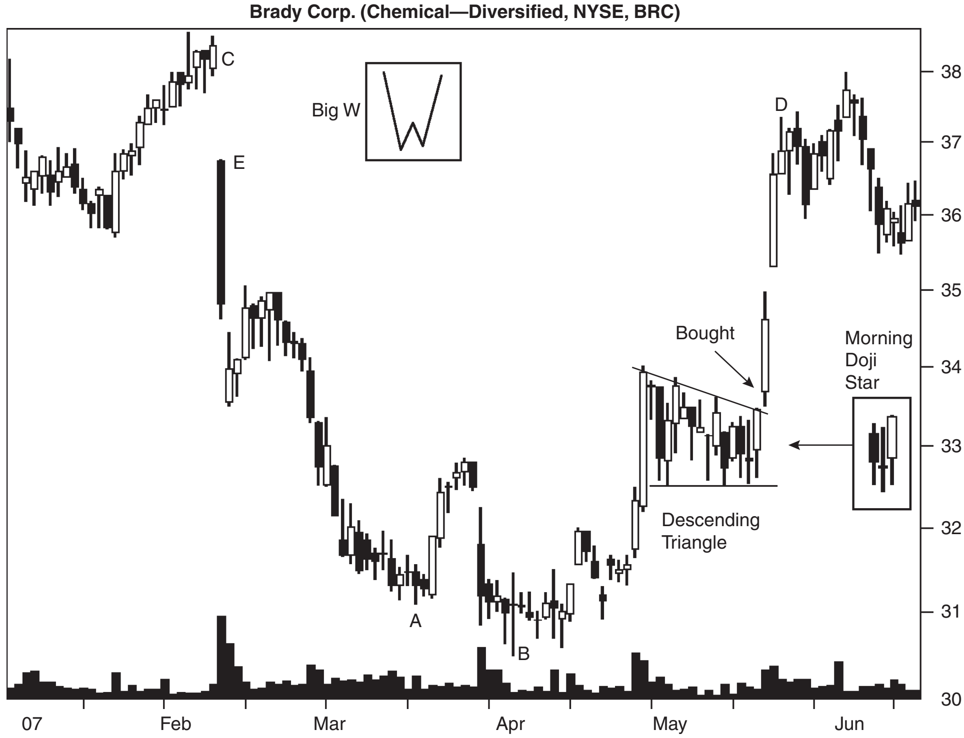

Figure I.1 The combination of a descending triangle, Big W, and morning doji star set up a profitable trade.

My candle research says that opening gap confirmation from a morning doji star results in the best performance. That means trading with the trend as soon as possible.

The next day, I watched the stock open and price took off. In the first minute, it shot from the prior close of 33.46 to 34. That left a tall white candle on the chart. Again, my research and knowledge of candles said that the body of a tall candle is often a support zone. So, I placed a buy order halfway down the body, at 33.78.

Sure enough, price turned down and nailed my buy order, filling most of it before moving up again. I had trouble fitting through the door because the smile on my face was so wide. Five minutes later, the remainder of the order filled.

By day's end, the stock had recovered and closed higher by 1.16. The next day a brokerage firm upgraded the stock and price moved higher still, this time up another 1.93. The following day price coasted upward 33 cents (D).

Exit time. Why? This is one of those situations where you get a feeling that it's time to leave, so I started my analysis. The height of the candle lines was diminishing, suggesting a trend change. The Commodity Channel Index (CCI, with default settings of 20 bars for the lookback and 5 for the DCCI line—dual

CCI, a smoothing of the CCI), an indicator, was rounding over and looked as if the next day would produce a sell signal. In other words, upward price momentum was slowing. I didn't want to hang around and give back my profits.

The falling window from C to E I thought added to overhead resistance, but my research said that happens only 25% of the time. The candle pattern at D also resembled a shooting star, with a tall upper shadow and small body after an upward price trend. This one wasn't perfect, because the body was too tall in relation to the height of the upper shadow. If you have no idea what an upper shadow and a body are, don't worry about it. I'll explain them later.

The day after D, I vowed that if the stock opened lower, I would sell. I thought of selling it all at the open but the futures market suggested a higher open for equities, so I decided to wait and see.

Volume was thin in the stock but it opened lower, just as I expected. I timed the exit as best as I could and got out just before price plummeted. By the day's close, however, the stock had gained it all back and then some. The candle that printed on the chart was a hanging man. Despite their reputation as a reversal, they act as a continuation pattern 59% of the time. That suggested more upside. But it doesn't matter because I don't own the stock anymore.

If you want to replicate this trading setup, look for:

- *Good industry relative strength.* If the stocks in the industry are doing well, then the chances improve that this stock will do well, too.
- *Better than expected earnings.* Only price can tell you how much the market likes the results, so watch the stock after the announcement of earnings. If price gaps upward, buy immediately or wait for a retracement and then buy.
- *A reason to buy the stock from a technical or fundamental perspective.* Even if price does not explode higher at the open, it should do well in the coming weeks based on your analysis.

I used an upward breakout from a descending triangle with a morning doji star inside a Big W pattern. The combination worked well but will be almost impossible to duplicate.

What Are Candlesticks?

Let's talk about candlesticks, starting at the beginning so everyone comes up to speed at the same time. I'll be brief because most people know what candle charts are. Figure I.2 shows two examples of candlesticks. The *line* (a single price bar) on the left is a white candle. This one shows the relative positions of the open, high, low, and close. Notice that the closing price is higher than the

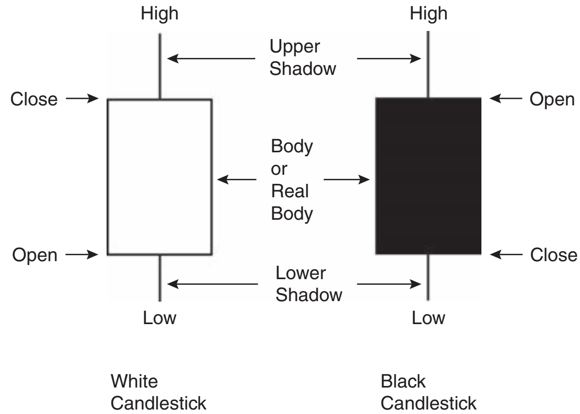

Figure I.2 White and black candlestick lines.

opening price. When that occurs, the body is white. On the right, the candle is black because price closed below the open. The upper shadow is hair growing from the top of the candle, and the lower shadow is a single leg dangling from the bottom of the candle. It may help to think of shadows as wicks.

Candles don't need either an upper or a lower shadow. They don't need a body, either (such as when the open and close are the same). The key concept to remember is that a black candle shows a close *below* the open and a white candle shows a close *above* the open. A black candle does *not* show price closing lower than the previous day, nor does a white candle show a higher close than the day before.

With this candle definition, you can have a stream of white candles in a declining price trend, and black candles forming a rising price trend. I've seen both situations, too.

That's all there is to candle configuration. Multiple candle lines along with variations in shadow and body length make up the many candle patterns.

The Data

I wrote a computer program to recognize all of the candlestick patterns in this book. With nearly five million candle lines to explore for *each* of over 100 candle patterns, doing it manually was not an option.

I created what I call the *standard database*, a collection of data that doesn't change in size. It contains the 500 stocks of the S&P 500 index for 10 years covering both bull and bear markets. From the standard database I derive the frequency rank and prorate the number of times a particular candlestick pattern is found to determine whether it appears more often in bull or bear markets. Details of the database are in the "Glossary and Methodology" section at the back of the book.

If I find too few candles in the standard database, then I use up to three more databases, one containing archived stocks I no longer follow, one that is a five-year/500-stock database, and one that is the current database I use for trading. Together they comprise almost five million candle lines (price bars). I removed any duplicated candles between databases, and all four contain split-adjusted, clean data.

The Price Trend

Many candles have a defined price trend that leads to the start of the candle pattern. For example, a hanging man appears in an upward price trend, and a hammer appears in a downtrend.

How do you determine the trend? I use a 10-day exponential moving average as a starting point and season it with special rules to allow price trends of a day or two to override the result. The method is a bit complicated but it works well. It is, however, not perfect, but the large sample size I use helps compensate.

Candle Performance

How do you measure candle performance? Since candlestick patterns often lead to short-term moves, I used the closest minor high or low (swing high or swing low), depending on the breakout direction, to gauge performance. The straight-line move often isn't a long one, but it serves as a good proxy of what you can expect. The statistics in this book should be used to compare results from candle to candle, not as benchmarks of how well you will do trading candles.

Candles Post Breakout

How do you determine if a candle acts as a reversal or a continuation pattern? I tested three methods and checked the results visually using hundreds of candles. I chose the best method. Two were variations of an exponential moving average (the price trend) compared to the closing price over time. They were not as accurate or as simple as just looking for the breakout to determine reversal or continuation, success or failure.

An upward breakout occurs when price closes above the top (highest high) of the candle. A downward breakout occurs when price closes below the bottom (lowest low) of the candle. Marry the breakout direction with the price trend leading to the candle and you get either a reversal or a continuation of the prior trend. This is the same method I used with chart patterns. It's simple, it's repeatable, and it's a method everyone can agree with just by looking at the price trend surrounding a candle.

But there's a problem. Take a dragonfly doji as an example. The candle looks like the letter T with the close at the top of the candle. You would expect price to break out upward sooner than downward just because of where price closes in the candle.

First, the big surprise with such candlesticks is that price does *not* break out upward the next day. In one test I ran on 20,000 dragonfly doji patterns, it took an average of *four* days to break out upward in a bull market. Downward breakouts in a bear market took exactly the same time, four days, to make the journey. Yes, the position of the closing price *does* influence whether a candle acts as a reversal or a continuation, but not to the extent many believe.

Second, if a candle is supposed to act as a reversal, then price should reverse direction, regardless of where it closes in the candle. That's almost by definition. If you placed a stop-loss order a penny below a candle in a downtrend that failed to reverse, you'd be stopped out. So price should reverse quickly or it's useless as a reversal indicator.

To be fair, I'm not that stringent. I wait for price to *close* either above the top or below the bottom of the candle before I determine whether it's a reversal or a continuation. A hanging man, for example, takes an average of three days to prove it's a reversal.

Finally, I checked the statistical results, visually, with the candles themselves and found that the method agrees with how I would categorize each candlestick pattern. In other words, if the statistics said the candle acted as a reversal, then it did. If the stats said the candle acted as a continuation, then it did. I used my eyes and counted the results, then compared the results to the stats. Both agree.

Why am I making such a big deal about this? Because 31% of the candles in this book fail. That is, they don't work as advertised, and many work little better than random chance. There are exceptions, of course, and those are the candles you should rely on. That's why I wrote this book—to find those gems hidden on the floor of the exchange.

Results of Others

Other candlestick researchers may find different results than the ones presented here. Many factors can contribute to this, including pattern recognition methodology, data used for testing, time period studied, and rules for measuring performance.

I am reminded of the tests researchers do on drugs. Does aspirin reduce the occurrence of heart attacks? Out of 50 studies, for example, some will conclude that it does, some will say it doesn't, and some may decide that it works only for women. However, the preponderance of results one way or the other will tilt the scale to a conclusion. I offer the information in this book as just one more test to add to the pile. Your results may vary.

Don't Write This Book

I read a book that used nearly six pages to justify why writing an encyclopedia like this one is a bad idea. The primary argument was that candles don't work alone but in groups. That sounds wonderful, but my response is this: Imagine five blind men. You ask each blind man how to get to the nearest grocery store in a neighborhood that he's never visited. "I don't know," come the replies, one after another. Then you put the five men together in an empty room and—eureka!—do they magically discover how to get to the grocery store? I don't think so. If candles don't work alone, then it's unlikely they'll work together.

Now, imagine one of the men can see. The sighted man, working alone, looks out a window and sees the grocery store down the road. Put him together with the others and they can hatch a plan to get there. In other words, finding a candlestick that works alone might help the performance of other candlesticks, too. After all, many candles become part of other, more complicated, candle patterns.

Suppose that you start not with 5 men but with 103, the same number as candlestick patterns in this book. You don't know how many can see, but you assume there are some. So you test each one, and when you're done, you separate the blind folks from those who need reading glasses from those with perfect vision. Some might suffer from night blindness, so the quirks of each are important and you make note of them.

Wouldn't you like to avoid spending time learning about reversal candles that fail to reverse more often than not? Wouldn't you like to avoid candles that perform randomly or near randomly and concentrate on proven winners?

That's what this candlestick encyclopedia is all about. It's about finding the candles that can make you money whether you rely on them standing alone or in combinations with other candles. It's about making money. And if you choose not to buy this book and learn the secrets it reveals, that's okay. I'll be the one using a transporter to beam up a pound of $50 bills, and you'll be the one gripping an empty wallet or purse, wondering where your money went.

Knowledge is power. Knowledge is money.

1

Findings

Arguably, you are reading the most important chapter because it discusses the discoveries I made about candles while researching this book. You may already know some of them, but the others are new. I'll refer to many of them in later chapters.

A Number of Candles Do Not Work as Expected

This is the big surprise for candle lovers. A candle that functions as a reversal of an upward trend should cause price to drop. Thus, a close above the top of the preceding candle would be a failure because price climbed instead of fell, whereas a close below the previous low would be a success. Similarly, a continuation candle should have price break out in the same direction as it entered. If price rose into the candle, for example, it should break out upward; a downward breakout would be a failure. How many of the 103 candles I looked at passed or failed according to this method?

Passed: 69%

Failed: 31%

If you listen closely, you may hear the half-glass-full people screaming. Yes, 69% of the candles worked, so let's discuss additional tests. If I say that a success rate of less than 60% is considered just random, then how many candles worked at least 60% of the time? There are 412 different combinations of 103 candles that acted as reversals or continuations in bull and bear markets. Of the 412, only 100 candles qualified, so the answer is 24%.