

— CHAPTER 1 —

CANDLESTICK BASICS AND TESTING REQUIREMENTS

Candlestick charting was developed in Japan about 300 years ago as traders noticed specific price patterns and began using them for forecasting price movements in the rice market. Japan had an active market in trading rice, and even rice futures, during the 1700s. Traders involved in this market noticed that certain patterns in price movements often preceded moves in the price of rice. They began to look for and study these patterns and to use them in determining whether to take positions.

While candlestick techniques have been used for hundreds of years in Japan, they are a relatively new tool for trading stocks in the West. It is thought that candlestick techniques started moving beyond a few pioneers in Western markets during the 1980s and gained popularity during the 1990s after the publication of several books on the subject, most notably Steve Nison's *Beyond Candlesticks: New Japanese Charting Techniques Revealed* and *Strategies for Profiting with Japanese Candlestick Charts*.

Some traders feel that candlestick patterns are mysterious and must be highly effective if they have been in use for hundreds of years; however, there are many products that have been around a long time and may or may not be effective. It's not the length of time something has been around that matters; it is whether it produces results. Some candlestick patterns are great tools; others are interesting but less effective. The trick for traders is to know which ones work best, and how to improve the others.

Many candlestick patterns were given names 300 years ago by the Japanese rice traders. The traders used the names to describe the pattern. Some, like the hammer pattern, look just like what the name suggests. Others seem a little less descriptive to Western traders. However, names of common Western patterns like island top, climax run, head and shoulders, and double top may also seem strange to new traders. The strangeness of the name is unusual at first, but soon becomes just a name as the trader studies and becomes familiar with the pattern.

In any case, a name is a name. It is the ability to recognize the pattern that is important. In this chapter, we will look at several popular candlestick patterns and then learn how and when to pull them from our toolbox and put them to use. But first, let's go over the basics.

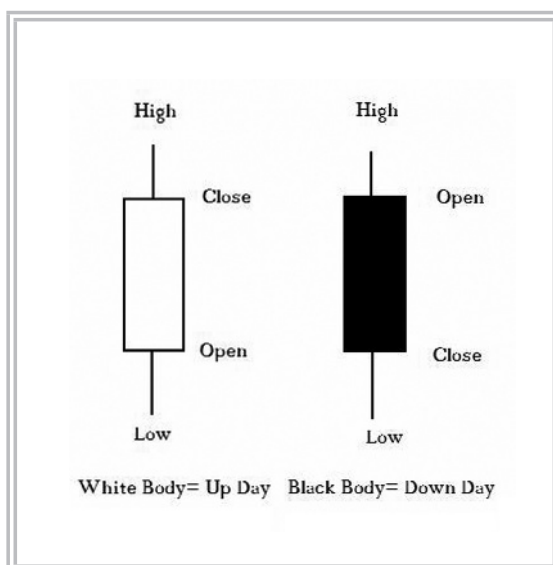
WHAT IS A CANDLESTICK?

Candlestick patterns, like Western patterns, show relationships between the opening, closing, high, and low prices of a stock on one or more days. Bar charts and candlesticks are both constructed from the same information; they just display it in a slightly different manner.

A basic candlestick representation of each trading day looks like Figure 1.1. The rectangular area is the candlestick body and represents the distance or price change between the opening and the closing price for the day. If the stock moved up on the day, the candlestick body color is white. If the stock moved down, the candlestick body is black. The different body colors make it easy to glance at a candlestick chart and tell instantly if the stock was up or down for the day. If the stock is consistently moving up, you will see a chart

with a lot of white bodies. If the stock is mostly moving down, you will see a chart with a lot of black bodies.

**FIGURE 1.1:
BASIC CANDLESTICK REPRESENTATION
OF A DAY'S TRADING RESULTS**



The thin lines on the top and bottom of the candlestick body are called shadows or tails. The end of the upper shadow shows the high price for the day, the end of the lower shadow shows the low price for the day. The day's trading range is the difference between the top of the upper shadow and the bottom of the lower shadow. Single day candlestick patterns are defined by the relationships between the size of the body and the two tails. Multi-day patterns are defined by the relationship of the body and shadow patterns across more than one day.

Candlestick patterns, like Western patterns, may be formed over one or more days. An island top can form in three days, a head and shoulders may form over several weeks. A hammer is a one day candlestick pattern, while a bullish engulfing pattern forms over two days. In general, patterns occurring over a few days may indicate short term direction, and patterns occurring over

several weeks may indicate longer-term direction of prices. Now let's take a look at some of the more popular candlestick patterns. After learning these, we will investigate how often they work and what makes them effective.

HAMMER AND HANGING MAN CANDLESTICK PATTERNS

THE HAMMER

The hammer and hanging man patterns are identical and have long lower shadows, short or no upper shadows, and small bodies. The pattern, shown in Figure 1.2, is called a hammer if it occurs during a downtrend and a hanging man if it occurs during an uptrend. The color of the body is not important. The lower shadow should be twice the length of the body or more. There should be no or very little upper shadow, indicating that the day's high should be near the close for a white body and near the open for a black body.

FIGURE 1.2:
BASIC HAMMER AND HANGING MAN
CANDLESTICK PATTERNS

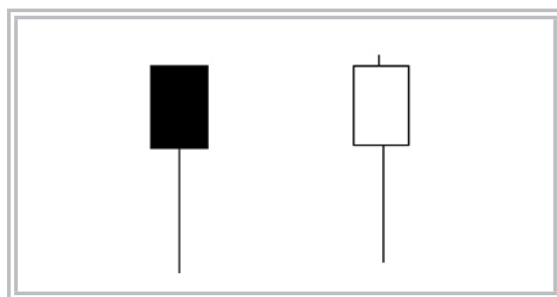


Figure 1.3 shows a candlestick chart of BBH. BBH had been in a clear downtrend during January, February, and the first part of March 2007. On 03/14/07, BBH formed a hammer pattern as marked by the up arrow. The hammer pattern marked the end of the downtrend, and BBH rose more than seven points during the next five sessions. Obviously, not every hammer

pattern is a profitable trade. The important question for traders is: how often does the pattern result in profitable trades, and are there other factors that influence the results? These questions can be answered by using backtesting techniques to examine the results of thousands of trades.

FIGURE 1.3:
CANDLESTICK CHART WITH HAMMER PATTERN



Courtesy of AIQ

Chapter four will focus on trading the hammer pattern and address questions that successful traders must know the answers to:

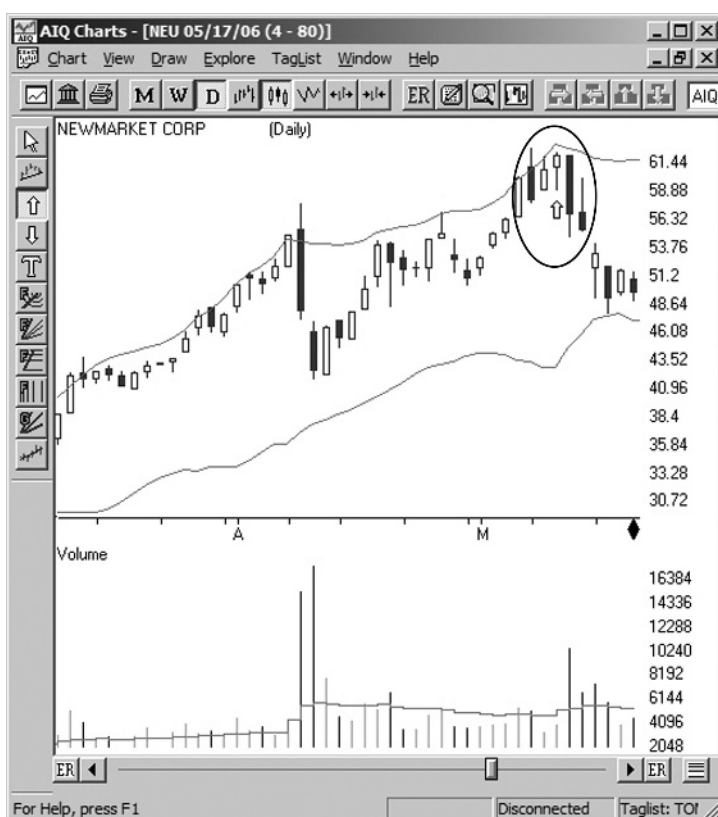
- What constitutes a small upper shadow?
- How does the shadow length affect trading results?

- How do closing price and volume affect trading results?
- Does the size of the day's trading range affect the results of trading hammers?

THE HANGING MAN

Figure 1.4 shows a candlestick chart of NEU during the first half of 2006. On 05/09/06, NEU formed a hanging man pattern as marked by the up arrow in Figure 1.4. The hanging man pattern marked the end of the uptrend in NEU and subsequently, it declined nearly 12 points during the next four trading sessions.

FIGURE 1.4:
CANDLESTICK CHART WITH HANGING MAN PATTERN



Courtesy of AIQ

When traders get together and discuss trading patterns or setups, someone usually asks why a particular pattern works. To explain trading patterns, the market is often described as a battle between the bulls trying to drive prices up, and the bears trying to drive prices down. The patterns are the result of this contest between the bulls and bears. In the case of a hammer pattern, the stock has been in a downtrend, indicating that the bears have control. When the hammer forms, the price is initially driven down further by the bears, forming the long lower tail. At some point during the day, the bulls step in and drive the price back up near the opening, forming the small body. The hammer forms at a point where bullish investors are willing to step in; therefore, the downtrend ends and the stock begins to move up.

Some traders will start using a pattern or trading system when they hear an explanation of why it works that makes sense to them. We all have a need to understand why something should work. However, for traders, it is more important to know how often a pattern works rather than an explanation of why it works. Knowing why a pattern works is interesting. Knowing how often a trading pattern works can be profitable. And, knowing in what specific market conditions a pattern works best can be very profitable. In the next chapter we will address these issues and develop a working knowledge of when to use candlestick patterns and when to use another tool from the trading toolbox.

Chapter five will look at issues related to trading the hanging man pattern including:

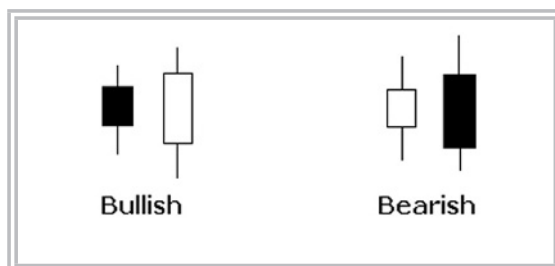
- How do bullish or bearish market environments affect trading results for the hanging man pattern?
- What happens if the pattern occurs on the recent highs of the move?
- Does using the MACD for timing improve results?
- Does waiting for confirmation improve results?
- How long should a position be held?

BULLISH AND BEARISH ENGULFING CANDLESTICK PATTERNS

BULLISH ENGULFING

The hammer and hanging man candlestick patterns occur in a single day. Engulfing patterns take two days to form and focus on the relationship between the candlestick bodies of both days. The candlestick shadows are not important to defining the pattern. A bullish engulfing pattern occurs when the white body of the second candlestick engulfs or covers the black body of the first candlestick in the pattern as shown in Figure 1.5. A bearish engulfing pattern occurs when the black body of the second day engulfs or covers the white body of the first day.

FIGURE 1.5:
BASIC ENGULFING PATTERNS

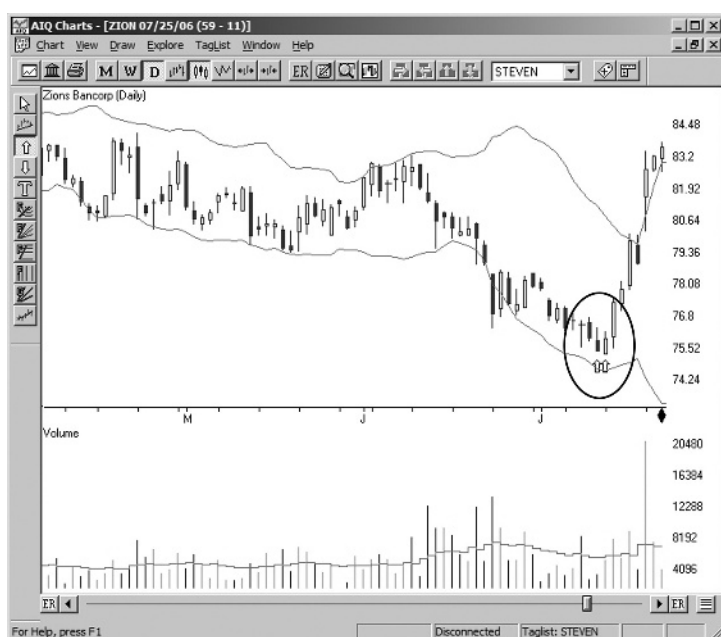


The bullish engulfing pattern is a reversal pattern formed when the stock is in a downtrend, and often signals a short term reversal or bounce in the stock price. The first candlestick in this two day pattern has a black body, indicating the bearish downtrend is still intact. Black bodies indicate the stock closed down for the day. The second candlestick has a white body extending below the first day's body, indicating the stock gapped down at the open. The lower end of a black body is the day's closing price, and the lower end of a white body is the day's opening price. Thus, when the second day's white body engulfs or covers the first day's black body, the price gaps down in the morning indicating more bearishness, then reverses to close

above the previous day's opening, indicating a reversal in sentiment for the second day that often continues in the short term.

Figure 1.6 shows a four-month candlestick chart of ZION. During late June and early July of 2006, ZION was in a clear downtrend. On July 13 and July 14, it formed the two day bullish engulfing pattern as marked by the up arrows. During the five days following the formation of the bullish engulfing pattern, ZION ran up more than seven points.

FIGURE 1.6:
ZION BULLISH ENGULFING PATTERN OF 7/14/06



Courtesy of AIQ

The bullish engulfing pattern does not always mark the end of a downtrend, but often does. Trading is a statistical business and patterns do not work all the time. Some trading patterns yield positive results a significant percentage of the time. Using trading patterns that win more often than they lose can be profitable in the long run. One of the keys to trading is to understand which patterns and techniques to use and in what market conditions they will be

effective. That's what this book is all about. Traders need to understand how often a pattern produces profits and how often it generates losses, and then fill their trading toolboxes with techniques that are profitable more often than random chance.

The bullish engulfing pattern is examined in more detail in chapter two where we look at the effects of several parameters on the trading results for bullish engulfing patterns including:

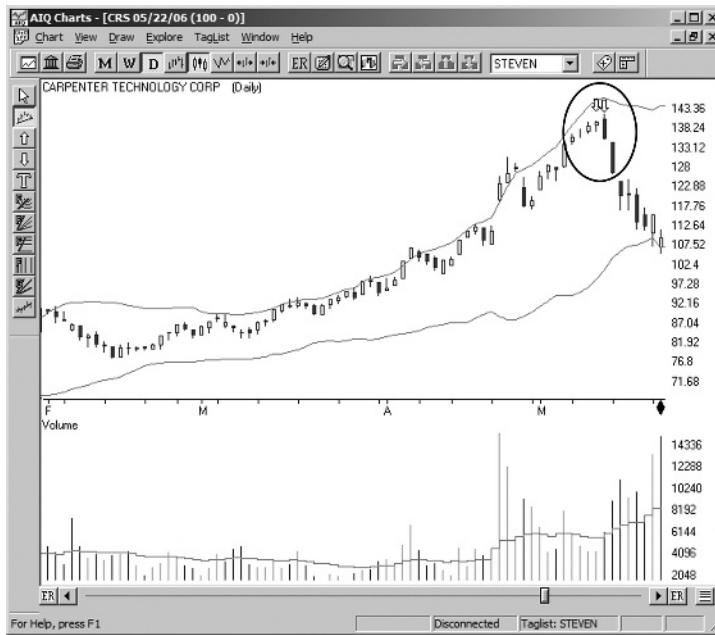
- Test results in multiple time periods.
- Test results in bullish and bearish market environments.
- Effect of stock price and volume on trading results.
- Effect of second day volume spike on trading results.
- Effect of using a 50 period moving average filter on trading results.
- Effect of upper shadow size on trading results.

BEARISH ENGULFING

A bearish engulfing pattern may occur after a stock has been in an uptrend. The first day of this two day pattern shows a white body, indicating the stock was still moving up. The second day of the pattern has a black body that completely covers or engulfs the body of the previous day. The top of the black body represents the opening price, which has gapped up, since it is above the top of the previous day's body, which represented the closing price for the first day of the pattern. After the open on the second day, the stock may move up further depending on whether the second day's candlestick has a top shadow or tail. Because the second day is a black candle, it means that at some point during the day the sentiment reversed and the price started declining. This change in sentiment could signal a further decline in the short term.

Figure 1.7 shows a candlestick chart for CRS, which was in an uptrend during February, March, April, and early May of 2006. It formed a bearish engulfing pattern on 05/11/06, as marked by the two down arrows. After the formation of the two day pattern, the stock dropped more than 25 points. The bearish

FIGURE 1.7:
CRS BEARISH ENGULFING PATTERN OF 05/11/06



Courtesy of AIQ

engulfing pattern marked a clear and decisive end to the uptrend. In this case, traders would have profited by entering short positions in CRS after the bearish engulfing pattern formed and then covering just seven sessions later.

In addition to knowing how often a particular trading pattern produces profitable trades, traders should understand if there are observable parameters that can strongly influence results.

Some of the questions traders should address before using a trading pattern are:

- How long should a position be held?
- What are good profit target points?
- What type of orders should be used?

- Where should stop loss orders be entered?

These and other issues affecting trading results will be addressed in chapter three.

MORNING AND EVENING STAR PATTERNS

MORNING STAR

The morning star pattern is a three bar pattern that marks the end, or reversal, of a downtrend. The first bar is a long black body that indicates a continuation of the downtrend. The second bar features a small body, which can be either black or white, and gaps lower. The third day of the pattern shows a white body that closes well within the area of the first day's black body. Figure 1.8 shows a basic morning star pattern.

FIGURE 1.8:
BASIC MORNING STAR PATTERN

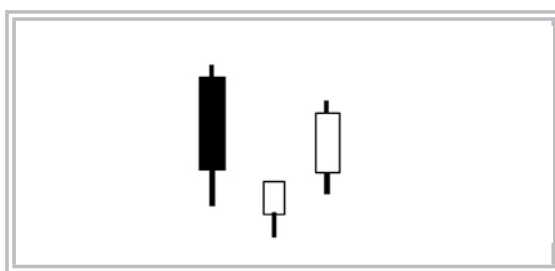


Figure 1.9 shows a candlestick chart for STI, which formed a morning star pattern on 04/13/07. STI had been in a downtrend and formed a large black body on 04/11/07. The following day, STI showed a small white body that gapped lower, and on the final day of the three day pattern, the morning star was completed by the formation of the large white body marked by the

**FIGURE 1.9:
MORNING STAR PATTERN IN STI ON 4/13/07**



Courtesy of AIQ

down arrow. The morning star pattern marked the end of the downtrend, and STI rose nearly 10% over the next few days.

Chapter six examines the effects of altering each of the parameters of this three day trading pattern in order to determine what works best; these include:

- Effect of candlestick body size on trading results.
- What constitutes a “small body” on day two of the pattern?
- Effect of market conditions on trading results.
- Does the color of the day two body matter?
- Performance in multi-year test periods.

EVENING STAR

The evening star is a three bar reversal pattern that may signal the end of a stock's uptrend. The first candlestick in the pattern has a long white body, indicating the current uptrend is continuing. The second candlestick in the evening star pattern gaps up and then forms a small body. The distance between the open and close is not very large, as if the enthusiasm of the initial opening gap up cannot be maintained. The third candle in the pattern is a black candle indicating a reversal of sentiment, and the black candle must close at least halfway down the range of the first day's candlestick. The basic evening star pattern is shown in Figure 1.10.

**FIGURE 1.10:
BASIC EVENING STAR PATTERN**



Figure 1.11 shows a candlestick chart for ADBE, which was in an uptrend during April of 2006. The uptrend ended with the formation of an evening star pattern on 05/01/06. On the first day of the pattern, ADBE formed a long white bar, followed by a gap up and a narrow-bodied black bar on the next day. The pattern was completed on the third day, when ADBE formed a large black bar that closed well into the range of the first day. Following the formation of the evening star pattern, ADBE dropped more than 10% over the next few days.

Chapter seven examines the evening star pattern in more detail in order to determine how the various parameters in the definition affect trading results.

**FIGURE 1.11:
EVENING STAR PATTERN IN ADBE ON 5/01/06**



Courtesy of AIQ

These include:

- The effects of a very low day three in the pattern.
- The effect of a long day three body.
- Does a gap down on day three affect the trading results?
- What is the effect of white space gaps on trading results?
- What is the effect of various day two body size requirements?
- What exactly constitutes a “big” body on the first day of the pattern?

TESTING CANDLESTICK PATTERNS

Candlestick patterns can be effective tools for the trader's toolbox; however, like any other tool, the user needs to understand exactly what it is designed for and how to use it effectively. Carpenters can make beautiful things with a table saw, but they have to know how to use it and when another tool might be more appropriate for the task at hand. They also need to know the safety rules, how to avoid kickback, and the importance of using a push tool. At least the carpenters that still have all their fingers do.

The analogy holds for trading patterns. There are times when a particular candlestick pattern is effective, and times when another candlestick pattern should be used to do the job. Trading any pattern, candlesticks or some other technique, without a clear understanding of what it is and what to expect in different situations is like using a power tool without an understanding of its use and safety precautions. To protect your fingers and your money, it is a good idea to have a clear understanding of how the tools you are using work.

It is not unusual for trading patterns to have undefined or unclear parameters. Some patterns, such as the hammer, have specifications that may be interpreted differently by different traders. The same is true for Western patterns such as flags and the head and shoulders pattern. The hammer pattern requires, "little or no upper shadow." The definition of "little" will be interpreted differently by individual traders. This is one reason that several traders using the "same" pattern may see different results. One way to address this is to study the results of many trades using different lengths of upper shadows and then to compare the results. This process results in a clear definition of what constitutes "little upper shadow" and has the added benefit of giving the trader an indication of the type of results the pattern may produce.

Some traders gain a better understanding of trading patterns, and the environments in which to use them, through experience. After trading for a number of years, they begin to understand which variations of a particular trading pattern work best, and which ones are more prone to failure. Experience often produces good results when we are listening closely; however, it can be costly.

The Tidal Force of the Market

The overall market has a strong effect on how well trading patterns perform. Focusing solely on the patterns or setups in the individual stocks that you are trading can diminish results or make them highly variable. This is another reason why traders using the same patterns may experience different results. Trading patterns are like waves at the beach; they all are affected by the tide.

Even when the tide is going out, there are waves coming in, just as there is usually something moving up even in bearish market conditions. Like conditions at high tide, when the market is bullish, we are likely to see more stocks moving up. Using different trading tools designed for specific market conditions is a process I call market adaptive trading (MAT), which we will cover in the last chapter.

In order to develop the tools and techniques for market adaptive trading, one has to be able to analyze a number of different trading tools in various market conditions and determine which are the most effective in specific market environments. After doing this, a trader can look at the market to determine the current environment, then open the trading toolbox and select the appropriate tools. Without this knowledge, the trader may be using the wrong tool, which could lead to significant drawdowns and wide account swings.

I believe a less expensive way to develop an in-depth understanding of how trading patterns work is by backtesting the pattern. Backtesting allows us to test how simple variations or changes in the trading pattern affect results. Backtesting can be done during a variety of time periods and even in specific market conditions.

You do not have to become a software engineer to backtest candlestick patterns; there are several good products available that provide backtesting tools traders can use. In fact, most of the available choices provide excellent results and probably more statistics than the average trader may care about. All of my backtesting results shown in the subsequent chapters were produced using AIQ Systems' Trading Expert Pro. The analysis can also be done with other backtesting tools; the important thing is to make sure to do the analysis before trading a system with hard-earned money.

WHY BACKTEST?

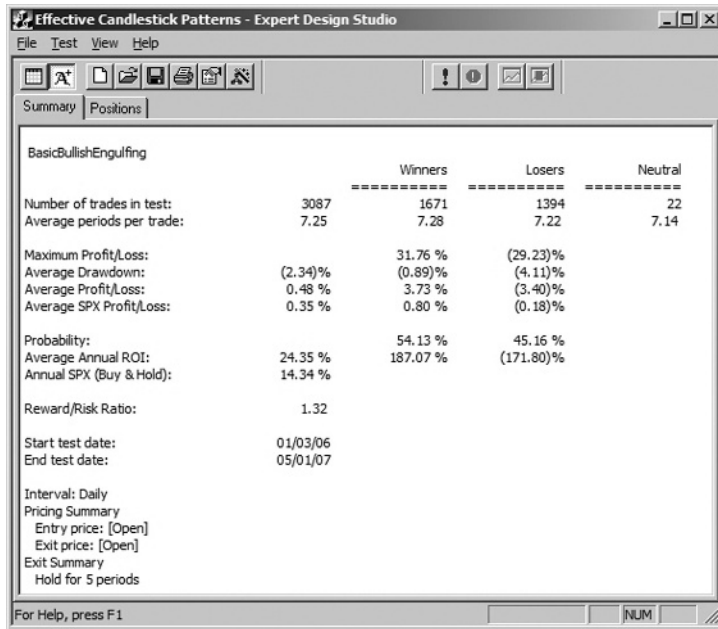
Backtesting allows traders to see how a system has performed in the past, to evaluate different filters and parameters, and to evaluate a system in different market conditions. Backtesting is not a guarantee of future performance. Successful backtesting requires an ability to describe the trading pattern in a backtesting language, knowledge of appropriate testing periods, an understanding of how to interpret the results, and an ability to add and test different filters or parameters to the original test description.

HOW DOES BACKTESTING WORK?

The process of describing the trading pattern in a backtesting language varies depending on which program is being used. Each software package has its advantages and disadvantages. The key is to select one that is easy to understand and use. More power and features are a waste if you cannot figure them out.

Backtesting results are typically presented in a format similar to that shown in Figure 1.12. The results in Figure 1.12 provide a lot of information, including the number of winning and losing trades, maximum profit and loss, average drawdown, the probability of winning and losing trades, annualized ROI, and other factors. It is usually not necessary to absorb all these numbers—there are really just four things that matter. The rest is interesting but not vital.

**FIGURE 1.12:
TYPICAL BACKTESTING RESULTS**



Courtesy of AIQ

The four key things to look for in backtesting results are:

- The number of trades in the test period.
- The annualized ROI.
- The percentage of winning trades.
- The percentage profit/loss of the average winning/losing trade.

The number of trades in the test period gives you an idea of how valid the test results might be, and whether it is worth trading. A trading pattern that only produces a few trades a year may be due to seasonal or news factors and not the pattern itself. A trading pattern that produces 100 trades a year is more likely to be due to the characteristics of the pattern itself, and, therefore, has a better chance of recurring in the future.

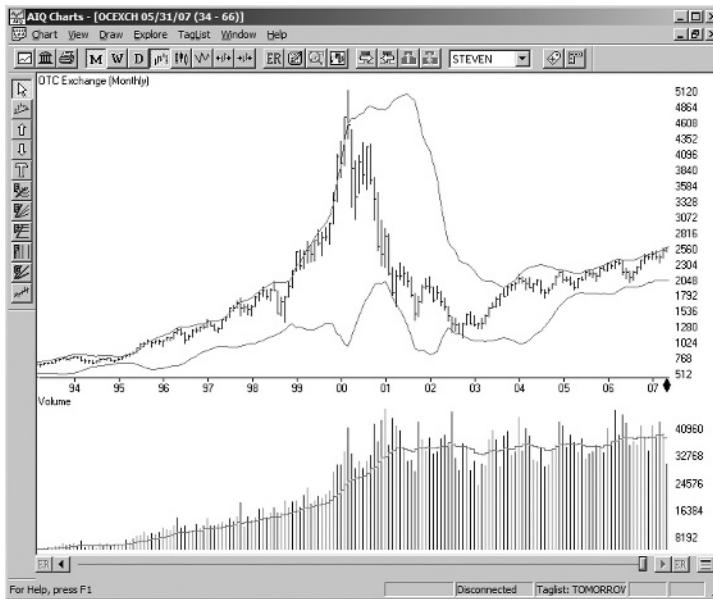
The annualized ROI provides an indication of how well the trading pattern performs. Since the number is usually calculated by taking the percentage gain for a trade during the holding period and then annualizing the result, it can exaggerate the returns of patterns with short holding periods that do not occur very often. This is rarely the percentage return traders will see in their account because many traders cannot take all the trades generated by a trading pattern, and the calculation does not include slippage and transaction fees. The ROI number is best used as a figure of merit; more is generally better. Annualized ROI is like the gas mileage numbers posted in a car dealership—you know you will not get that exact mileage, but bigger numbers are generally better than smaller ones.

The percentage of winning trades for a trading pattern is important. If the average profit on a winning trade is larger than the average loss on a losing trade, then, in general, the more often the pattern produces a winning trade, the better the results. Imagine we are going to flip a coin 100 times, and every time it comes up heads, you give me \$1.50; and, when it comes up tails, I give you \$1.20. Over the long run, I expect the outcome to be profitable for me, and frankly hope you will continue to play.

The odds for each coin flip are 50/50 for heads. I do not know if any particular coin flip will be profitable for me; but, since I expect to win about half the time, and since I get paid more when I win than I have to pay when I lose, I should make a profit in the long run. Trading patterns are similar in that you do not know the outcome of any particular trade; but, if your odds of a winning trade are better than 50/50, and you make more on the average winner than you lose on the average loser, you would expect to make money in the long run.

Trading patterns should have an advantage over coin flipping; they should provide winning trades more than half the time. This stacks the odds in the trader's favor. If a trading pattern wins more than 50% of the time, and the average winning trade gains more than the average losing trade loses, then trading is a better game than the coin flip example. The stock pattern trader still does not know if any given trade will be profitable, but over the long run, the odds are favorable for the net result to be profitable. Traders do not focus on the results of any one trade, they focus on whether or not the account balance is going up over the long run.

**FIGURE 1.13:
NASDAQ MONTHLY CHART 1994 TO 2007**



Courtesy of AIQ

WHAT TIME FRAME DO I USE?

While backtesting can yield great insight into how candlestick patterns perform and the risks associated with particular trading patterns, they need to be run over a specific time frame. Choosing that time frame can be confusing. Many people initially feel that the longer the time frame of the backtest, the better the results. Figure 1.13 illustrates why there is a better way to select time frames for backtesting.

Figure 1.13 shows the NASDAQ market over a 14-year period. If backtesting is done over a specific time period, then one is assuming that the next period of similar length will be just like the previous period. If one tests a trading pattern over the 2004 to 2007 period and uses the results to trade in 2007 to 2010, the trader is expecting the 2007 through 2010 period to look similar

to the 2004 through 2007 period. This may at first seem reasonable, but further examination of Figure 1.13 reveals that it is hard to find two four-year periods that look just like each other.

The market is always changing; we do not know what it will look like in the future. There is one constant though: Each market time frame is made from a collection of bullish, bearish, and trading range periods. The market is either going up, down, or sideways. It is impossible for it to do anything else. This indicates that trading patterns should be tested in each of the three conditions, and then traders should select the patterns that they have found to be most effective during the current conditions. Yes, testing a trading pattern over a calendar time frame is also good. But use more than one time period and also look at performance in each of the three types of market conditions to gain a better understanding of how a potential trading system performs and when to use it.

TRADING IS A STATISTICAL BUSINESS—RISK MANAGEMENT

The probability of a winning trade not only provides insight into whether a trading pattern is worth using, it also provides insight into position sizing and money management strategies. In the coin flip example, few people would want to bet their entire account on each trade because to come out ahead, they would need to win every coin flip. The more times the coin is flipped, the more likely it becomes they would lose their entire account. The same is true for trading.

If a trading pattern has a 50% chance of producing a winning trade, then the likelihood of eight losing trades in a row is one in 256. These seem like good odds against losing eight times in a row, unless you also consider how many trades the trader makes in a year. If the trader makes 50 trades a year, the trader is unlikely to see eight losing trades in a row and might consider risking 1/8 of the account on each trade. If another trader makes five trades a week, the odds are quite good that sometime during the year, he will see eight losing trades in a row. If the second trader risks 1/8 of the account on each trade, he has a good chance of going broke at some point during the year.

The amount risked on each trade should be a function of the probability of a winning trade, the number of trades made during the year, and the maximum drawdown the trader is willing to accept. Each trader has a different tolerance for risk. Some are bothered by a 10% drawdown in their account. Others do not lose sleep when experiencing a 30% drawdown. In this example, if each trader makes about 200 trades a year (and thus has a reasonable chance of seeing eight losing trades in a row), the first trader should risk less than 10% of his or her account divided by eight on each trade. The second trader should risk less than 30% of the account divided by eight.

The amount of risk, or maximum drawdown, a trader is willing to take divided by the maximum number of expected losses (which is a function of the number of trades made) is a starting point for considering the amount to risk on each trade. There are no guarantees in trading, but understanding how the winning percentage of the trading pattern and the number of trades affects overall risk is an important place to start when looking at risk management.

New traders often do not understand the risks they are taking and will blame drawdowns on bad luck, and then credit profits with their expertise at picking good trades. But always remember, trading is a statistical business. There is no magic indicator that will tell you which trades will work and which will not, no matter what those slick brochures say. Traders must understand the probabilities involved and how to use them to manage risk. The backtesting results are one way to gather some of this information.

Imagine 16 traders all using a trading pattern that wins half the time and yields 10% on each winning trade. If they all make a trade, we could expect eight traders to have winning trades with their accounts up 10%, and eight traders to have losing trades with their accounts down 10%. After the second trade, four traders would have winning trades both times and be up 20%. After four trades, there would be typically one trader who was up 40% and one who was down 40%.

The trader up 40% may be invited to speak on one of the financial programs “because he knows how to pick winners.” The one down 40% would “just

know” that the trading pattern did not work and may move on to another technique in an endless search for something better. Most of the traders would have results in the middle. Trading patterns that have winning trades more than 50% of the time and larger average wins than average losses move the odds significantly in the trader’s advantage. Making actual trades is the easy part of trading; most of the work goes into researching and carefully understanding how a trading pattern performs.

Traders want to use trading patterns that have winning percentages well above 50% because it stacks the odds in their favor. They also want the average winner to yield more than the average loser costs them. When these two conditions are met, the trader knows that the inevitable winning streaks should gain more than the inevitable losing streaks lose, and also the winning streaks should happen more often than the losing streaks. It is this knowledge that makes trading worthwhile. As is true with every business, knowledge is one of the keys to success in trading.

Trading without this knowledge exposes you to unknown risks. Traders with a clear understanding of how different trading patterns perform are willing to take known risks for expected gains. There is a connection between the level of risk assumed and the expected returns. Lower risks can be easier to tolerate, but often result in lower returns. Higher risks expose the trader to larger drawdowns, and potentially larger gains. Each trader needs to find the risk/reward scenario that is most comfortable for them.