

 WILEY Trading

MARKET STRUCTURE,  
PRICE ACTION, AND  
TRADING STRATEGIES

**THE  
ART AND SCIENCE OF  
TECHNICAL  
ANALYSIS**

ADAM GRIMES

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# The Art and Science of Technical Analysis

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*Market Structure, Price Action,  
and Trading Strategies*

**ADAM GRIMES**



**WILEY**

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*To my wife Betsy. Without her unfailing love and support I could have accomplished nothing.*

## Preface

The book you are holding in your hands is the product of nearly two decades of my study and experience as a trader, covering the full span of actively traded markets and time frames. I owe much to authors and traders who have come before me, for no one produces anything significant in a vacuum. I would not have been successful without the help and guidance of my mentors, but I learned many of the lessons here from my own mistakes. In some ways, this work represents a radical break from many of the books that have preceded it, and I hope it encourages you to question much of the traditional thinking of technical analysis.

This book does not present a rigid system to be strictly followed, nor a set of setups and patterns that can be assembled at the trader's whim. Rather, it offers a comprehensive approach to the problems of technically motivated, directional trading. The book is structured to be read from beginning to end, but individual sections and chapters stand on their own. Through the entire work, deliberate repetition of important concepts helps to build a complete perspective on many of the problems traders face. The tools and techniques must be adapted to the trader's personality and business situation, but most will find a firm foundation between these covers.

There are some underlying themes, perhaps not expressed explicitly, that tie this work together, and they may be surprising to many readers: *Trading is hard*. Markets are extremely competitive. They are usually very close to efficient, and most observed price movements are random. *It is therefore exceedingly difficult to derive a method that makes superior risk-adjusted profits*, and it is even more difficult to successfully apply such a method in actual trading. Last, *it is essential to have a verifiable edge in the markets*—otherwise no consistent profits are possible. This approach sets this work apart from the majority of trading books published, which suggest that simple patterns and proper psychology can lead a trader to impressive profits. Perhaps this is possible, but I have never seen it work in actual practice.

This book is divided into four parts:

- Part One begins with a look at some of the probability theory supporting the concepts of successful trading. Next comes an in-depth look at a specific approach to chart reading that focuses on clarity and consistency lays the foundation for building and understanding of price patterns in markets. This

section concludes with an overview of the Wyckoff market cycle, which is already well known in the literature of technical analysis.

- Part Two focuses on the details of trends, trading ranges, and critically, the transitions from one to the other in considerable detail. This is a deep look at the underlying foundation of price movements, and there is information here that, to my knowledge, has never appeared in print before.
- Part Three might appear, at first glance, to be the meat of this book, as it includes specific trading patterns and examples of those patterns applied to real markets. It also advocates a way of looking at indicators and other confirming factors that requires a deep understanding of the nuances of these tools. One of the key elements of any trading plan is how the trader sizes the trade and manages the position as it develops; these elements are also covered in considerable depth. Much attention is devoted to the many risks traders will encounter, both from the market and from themselves. Though most traders are going to be tempted to turn directly to this section, remember that these patterns are only the tip of the spear, and they are meaningless unless they are placed within the context provided by Parts One and Two.
- Part Four is specifically written for the individual trader, and begins by focusing on elements of psychology such as cognitive biases and issues of emotional control. Chapter 11 takes a look at many of the challenges developing traders typically face. Though it is impossible to reduce the trader development process to a one-size-fits-all formula, the majority of traders struggle with the same issues. Most traders fail because they do not realize that the process of becoming a trader is a long one, and they are not prepared to make the commitment. This section concludes with a look at some performance analysis tools that can help both the developing and the established trader to track key performance metrics and to target problems before they have a serious impact on the bottom line.
- Last, there are three appendixes in this work. The first appendix is a trading primer that will be useful for developing traders or for managers who do not have a familiarity with the language used by traders. Like any discipline, trading has its own idioms and lingo, an understanding of which is important for effective communication. The second expands on the some specific details and quirks of moving averages the MACD, which are used extensively in other sections of this book. The last appendix simply contains a list of trade data used in the performance analysis of Part Four.

This book is written for two distinct groups of traders. It is overtly addressed to the individual, self-directed trader, either trading for his or her own account or who has exclusive trading authority over a number of client accounts. The self-directed trader will find many sections specifically addressed to the struggles he or she faces, and to the errors he or she is likely to make along the way. Rather than focusing on arcane concepts and theories, this trader needs to learn to properly read a chart, and most importantly, to understand the emerging story of supply and demand as it plays out through the patterns in the market.

Though this book is primarily written for that self-directed trader, there is also much information that will be valuable to a second group of traders and managers who do not approach markets from a technical perspective or who make decisions within an institutional framework. For these traders, some of the elements such as trader psychology may appear, at first glance, to be less relevant, but they provide a context for all market action. These traders will also find new perspectives on risk management, position sizing, and pattern analysis that may be able to inform their work in different areas.

The material in this book is complex; repeated exposure and rereading of certain sections will be an essential part of the learning process for most traders. In addition, the size of this book may be daunting to many readers. Once again, the book is structured to be read and absorbed from beginning to end. Themes and concepts are developed and revisited, and repetition is used to reinforce important ideas, but it may also be helpful to have a condensed study plan for some readers. Considering the two discrete target audiences, I would suggest the following plans:

- Both the individual and the institutional trader should page through the entire book, reading whatever catches their interest. Each chapter has been made as self-contained as possible, while trying to keep redundancy to an absolute minimum.
- After an initial quick read, the individual trader should carefully read Chapters 1 and 2, which provide a foundation for everything else. This trader should probably next read Part Four (Chapters 11 and 12) in depth, paying particular attention to the elements of the trader development process. Next, turn to Chapters 6 and 10, which focus on often-misunderstood aspects of risk and position sizing. Two important aspects of the book are missed on this first read: in-depth analysis of market structure and the use of confirming tools in setting up and managing actual trades. These are topics for deeper investigation once the initial material has been

assimilated.

- For the institutional trader, Chapter 1 is also a logical follow-up to a quick read. Next, Chapter 2 would provide a good background and motivation for the entire discipline of technical analysis. Chapters 8 and 9 will likely be very interesting to this trader. For managers who are used to thinking of risk in a portfolio context, there are important lessons to be learned from a tactical/technical approach to position and risk management. Last, many of these readers will have an academic background. Chapters 2 through 5 would round out this trader's understanding of evolving market structure.

Following both of these study plans, it is advisable to then begin again from the beginning, or perhaps to turn to the parts of the book not covered in these shorter plans and pick up what you have missed. Intellectually, the material can be assimilated fairly quickly, but flawless application may remain elusive for some time. Additional materials supporting this book, including a blog updated with examples and trades drawn from current market action, are available at my web site and blog, [www.adamhgrimes.com](http://www.adamhgrimes.com).

The title of this book is *The Art and Science of Technical Analysis*. Science deals primarily with elements that are quantifiable and testable. The process of teaching a science usually focuses on the development of a body of knowledge, procedures, and approaches to data—the precise investigation of what is known and knowable. Art is often seen as more subjective and imprecise, but this is not entirely correct. In reality, neither can exist without the other. Science must deal with the philosophical and epistemological issues of the edges of knowledge, and scientific progress depends on inductive leaps as much as logical steps. Art rests on a foundation of tools and techniques that can and should be scientifically quantified, but it also points to another mode of knowing that stands somewhat apart from the usual procedures of logic. The two depend on each other: Science without Art is sterile; Art without Science is soft and incomplete. Nowhere is this truer than in the study of modern financial markets.

ADAM GRIMES

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# PART I

## The Foundation of Technical Analysis

# CHAPTER 1

## The Trader's Edge

If you would be a real seeker after truth, it is necessary that at least once in your life you doubt, as far as possible, all things.

—René Descartes

There is something fascinating and mesmerizing about price movements in actively traded markets; academics, researchers, traders, and analysts are drawn to study markets, perhaps captivated as much by the patterns in the market as by the promise of financial gain. Many people believe that price changes are random and unpredictable; if this were true, the only logical course of action would be to avoid trading and to invest in index funds. This is, in fact, what a significant number of financial advisers recommend their clients do. On the other hand, there are analysts and traders who believe that they have some edge over the market, that there is some predictability in prices. This camp divides into two groups that historically have been diametrically opposed: those who make decisions based on *fundamental* factors and those who rely on *technical* factors. Fundamental analysts and traders make decisions based on their assessment of value, through an analysis of a number of factors such as financial statements, economic conditions, and an understanding of supply/demand factors. Technical traders and analysts make decisions based on information contained in past price changes themselves.

Our work here concerns the latter approach. Few traders make decisions in a vacuum; technical traders may consider fundamental factors, and fundamental traders may find that their entries and exits into markets can be better timed with an understanding of the relevant elements of market structure, money flows, and price action. Most traders find success with a hybrid approach that incorporates elements from many disciplines, and there are very few purely technical or fundamental decision makers. The key distinction, for us, is that technically motivated traders acknowledge the primacy of price itself. They know that price represents the end product of the analysis and decision making of all market participants, and believe that a careful analysis of price movements can sometimes reveal areas of market imbalance that can offer opportunities for

superior risk-adjusted profits. Building the tools for that analysis and learning how to apply them is the purpose of this book.

## DEFINING A TRADING EDGE

Most of the time, markets are efficient, meaning that all available information is reflected in asset prices, and that price is a fair reflection of value. Most of the time, prices fluctuate in a more or less random fashion. Though a trader may make some profitable trades in this type of environment purely due to random chance, it is simply not possible to profit in the long run; nothing the trader can do will have a positive effect on the bottom line as long as randomness dominates price changes. In theory, in a true zero-expectancy game, it should be possible to trade in a random environment and to break even, but reality is different. Trading accounts in the real world suffer under the constant drag of a number of trading frictions, transaction costs, errors, and other risks. Together, these create a high hurdle that must be overcome in order to break even. It is even possible for a trader to work with a positive expectancy system and still lose a significant amount of money to the vig.

Newer traders especially are often drawn to focus on elements of performance psychology and positive thinking. There is an entire industry that caters to struggling traders, holding out hope that if they could just get their psychological issues resolved, money would flow into their trading accounts. However, this fails to address the core problem, which is that most traders are doing things in the market that do not work. Excellent execution, risk management, discipline, and proper psychology are all important elements of a good trading plan, but it is all futile if the trading system does not have a positive expectancy. These are essential tools through which a trading edge can be applied to the market, and without which a trader is unlikely to succeed in the long run. However, none of these is a trading edge in itself.

A *positive expectancy* results when the trader successfully identifies those moments where markets are slightly less random than usual, and places trades that are aligned with the slight statistical edges present in those areas. Some traders are drawn to focus on high-probability (high win rate) trading, while others focus on finding trades that have excellent reward/risk profiles. Neither of these approaches is better than the other; what matters is how these two factors of probability and reward/risk ratio interact. For instance, it is possible to be consistently profitable with a strategy that risks many times more than what is made, as long as the win rate is high enough, or with a much lower percentage of winning trades if the reward/risk ratio compensates. In all cases, the trading

problem reduces to a matter of identifying when a statistical edge is present in the market, acting accordingly, and avoiding market environments that are more random. To do this well, it is essential to have a good understanding of how markets move and also some of the math behind expectancy and probability theory.

## Expected Value

*Expected value* (or *expectancy*) is a term from probability theory that every good trader and gambler understands intuitively. For our purposes, we need to define a number of scenarios that each have a precisely defined payout (or loss), and we also need to be able to quantify the probabilities of each scenario occurring. If we are analyzing actual trading records, this can be as simple as calculating summary statistics for historical trades, but the problem is much more complicated on a look-forward basis because we have to make assumptions about how closely future conditions are likely to resemble history. Furthermore, we also need to make sure that our calculations include every possible outcome so that the probabilities sum to 1.0; this is sometimes difficult in real-world applications where unforeseeable outlier events may lurk in the future. Leaving these practical considerations aside for a moment and focusing on the underlying math, multiplying the payout of each scenario by the probability of each scenario occurring creates a probability-weighted average of the payouts, which is also called the expected value.

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## The Expected Value Formula

Formally, for  $k$  possible scenarios, each with a payoff of  $x$  and associated probability  $p$ , the expected value  $E(\cdot)$  is defined as:

$$E(X) = x_1 p_1 + x_2 p_2 + \dots + x_k p_k$$

or, in alternate notation:

$$E(X) = \sum_{i=1}^k x_i p_i$$

Consider a simplified example where a trader can either make or lose 1 point with 50 percent probability of either outcome. In this example, the relevant math is:  $E(X) = .5(1) + .5(-1) = 0$ . It is important to understand precisely what expectancy tells us, which, in the case of a simplified trading or game of chance scenario, is the average amount we should win or lose on each trial. Furthermore, and this is very important, like many things in the field of probability, expectancy is valid only over a fairly large sample size. Even though our trader was playing a zero expectancy game, it is entirely possible that the trader could have had many wins or losses in a row, and could actually have accumulated a significant gain or loss at some point. In fact, it is very likely this *will* happen because random data tends to have many more strings of runs than most people would expect. Over a larger sample, it is likely that the actual value realized will begin to converge on the theoretical expected value, but distortions can and do occur.

The bottom line is that you must have an edge. If you are not trading with a statistical advantage over the market, everything else is futile. Nothing will help. Discipline, money management, execution skills, and positive thinking add great value in support of an actual edge, but they are not edges in themselves. From a statistical standpoint, the definition of an edge is simple: can you properly identify entry and exit points in the market so that, over a large sample size, the sum of the profit and loss (P&L) from your winning trades is greater than the sum of your losing trades? The question then becomes: how do you find, develop, refine, and maintain an edge? There are many answers to that question; this book shows one possible path.

## Where Does the Edge Come From?

Many of the buying and selling decisions in the market are made by humans, either as individuals, in groups (as in an investment committee making a



decision), or through extension (as in the case of execution algorithms or “algos”). One of the assumptions of academic finance is that people make rational decisions in their own best interests, after carefully calculating the potential gains and losses associated with all possible scenarios. This may be true at times, but not always. The market does not simply react to new information flow; it reacts to that information as it is processed through the lens of human emotion. People make emotional decisions about market situations, and sometimes they make mistakes. Information may be overweighted or underweighted in analysis, and everyone, even large institutions, deals with the emotions of fear, greed, hope, and regret.

In an idealized, mathematical random walk world, price would have no memory of where it has been in the past; but in the real world, prices are determined by traders making buy and sell decisions at specific times and prices. When markets revisit these specific prices, the market *does* have a memory, and we frequently see nonrandom action on these retests of important price levels. People remember the hopes, fears, and pain associated with price extremes. In addition, most large-scale buying follows a more or less predictable pattern: traders and execution algorithms alike will execute part of large orders aggressively, and then will wait to allow the market to absorb the action before resuming their executions. The more aggressive the buyers, the further they will lift offers and the less they will wait between spurts of buying. This type of action, and the memory of other traders around previous inflections, creates slight but predictable tendencies in prices.

There is no mystical, magical process at work here or at any other time in the market. Buying and selling pressure moves prices—only this, and nothing more. If someone really wants to buy and to buy quickly, the market will respond to the buying and sellers will raise their offers as they realize they can get a better (higher) price. Similarly, when large sell orders hit the market, buyers who were waiting on the bid will get out of the way because they realize that extra supply has come into the market. More urgency to sell means lower prices. More buying pressure means higher prices. The conclusion is logical and unavoidable: buying and selling pressure must, by necessity, leave patterns in the market. Our challenge is to understand how psychology can shape market structure and price action, and to find places where this buying and selling pressure creates opportunities in the form of nonrandom price action.

## The Holy Grail

This is important. In fact, it is the single most important point in technical analysis—the holy grail, if you will. *Every edge we have, as technical traders, comes from an imbalance of buying and selling pressure.* That's it, pure and simple. If we realize this and if we limit our involvement in the market to those points where there is an actual imbalance, then there is the possibility of making profits. We can sometimes identify these imbalances through the patterns they create in prices, and these patterns can provide actual points around which to structure and execute trades. Be clear on this point: we do not trade patterns in markets—we trade the underlying imbalances that create those patterns. There is no holy grail in trading, but this knowledge comes close. To understand why this is so important, it is necessary to first understand what would happen if we tried to trade in a world where price action was purely random.

# FINDING AND DEVELOPING YOUR EDGE

The process of developing and refining your edge in the market is exactly that: an ongoing process. This is not something you do one time; it is an iterative process that begins with ideas, progressing to distilling those ideas to actionable trading systems, and then monitoring the results. Midcourse corrections are to be expected, and dramatic retooling, especially at the beginning, is common. It is necessary to monitor ongoing performance as markets evolve, and some edges will decay over time. To be successful as an individual discretionary trader means committing to this process. Trading success, for the discretionary trader, is a dynamic state that will fluctuate in response to a multitude of factors.

## Why Small Traders Can Make Money

This is an obvious issue, but one that is often ignored. The argument of many academics is that you can't make money trading; your best bet is to put your money in a diversified fund and reap the baseline drift compounded over many years. (For most investors, this is not a bad plan for at least a portion of their portfolios.) Even large, professionally managed funds have a very difficult time beating the market, so why should you be able to do so, sitting at home or in your office without any competitive or informational advantage? You are certainly not the best-capitalized player in the arena, and, in a field that attracts some of the best and brightest minds in the world, you are unlikely to be the smartest. You also will not win by sheer force of will and determination. Even if you work harder than nearly anyone else, a well-capitalized firm could hire 20 of you and *that* is what you are competing against. What room is there for the small, individual trader to make profits in the market?

The answer, I think, is simple but profound: you can make money because you are not playing the same game as these other players. One reason the very large funds have trouble beating the market is that they are so large that they *are* the market. Many of these firms are happy to scrape out a few incremental basis points on a relative basis, and they do so through a number of specialized strategies. This is probably not how you intend to trade. You probably cannot compete with large institutions on fundamental work. You probably cannot compete with HFTs and automated trading programs on speed, nor can you compete with the quant firms that hire armies of PhDs to scour every

conceivable relationship between markets.

This is all true, but you also do not have the same restrictions that many of these firms do: you are not mandated to have any specific exposures. In most markets, you will likely experience few, if any, liquidity or size issues; your orders will have a minimal (but still very real) impact on prices. Most small traders can be opportunistic. If you have the skills, you can move freely among currencies, equities, futures, and options, using outright or spread strategies as appropriate. Few institutional investors enjoy these freedoms. Last, and perhaps most significantly, you are free to target a time frame that is not interesting to many institutions and not accessible to some.

One solution is to focus on the three-day to two-week swings, as many swing traders do. First, this steps up out of the noise created by the HFTs and algos. Many large firms, particularly those that make decisions on fundamental criteria, avoid short time frames altogether. They may enter and exit positions over multiple days or weeks; your profits and losses over a few days are inconsequential to them. Rather than compete directly, play a different game and target a different time frame. As Sun Tzu wrote in the *Art of War*: “Tactics are like unto water; for water in its natural state runs away from high places and hastens downward ... avoid what is strong and strike at what is weak.”

# GENERAL PRINCIPLES OF CHART READING

Charts are powerful tools for traders, but it is important to think deeply about what a chart is and what it represents. Though it is possible to trade by focusing on simple chart patterns, this approach also misses much of the richness and depth of analysis that are available to a skilled chart reader. Top-level trading combines traditional left brain skills of logic, math, and analytical thinking with the intuitive, inductive skills of right brain thinking. Charts speak directly to the right brain, whose native language is pictures and images. Part of your edge as a discretionary trader comes from integrating these two halves of your being; charts are a powerful tool that can facilitate this integration and foster the growth of intuition.

Modern software packages are a mixed blessing for traders. On one hand, they have greatly increased the scope and breadth of our vision. It is not unusual for a modern trader to examine 400 or 500 charts in the course of a trading day, sometimes more than once, quickly assessing the character of a market or a set of related markets. This would not have been possible in the precomputer era, when charts had to be laboriously drawn and updated by hand. However, charting software also encourages some potentially harmful habits. It is so easy to add various plots and indicators to charts and to tweak and change settings and time frames that some traders are forever experimenting and searching for the holy grail of technical indicators. Other traders bury price bars behind a barrage of moving averages and other indicators, thinking that complexity will lead to better trading results. Simplicity is often better than complexity. A chart is nothing more than a tool to display market data in a structured format. Once traders learn to read the message of the market, they can understand the psychological tone and the balance of buying and selling pressure at any point.

When it comes to chart setup, there is no one right way, but I will share my approach. Everything I do comes from an emphasis on clarity and consistency. Clean charts put the focus where it belongs: on the price bars and the developing market structure. Tools that highlight and emphasize the underlying market's structure are good; anything that detracts from that focus is bad. When you see a chart, you want the price bars (or candles) to be the first and most important thing your eye is drawn to; any calculated measure is only a supplement or an

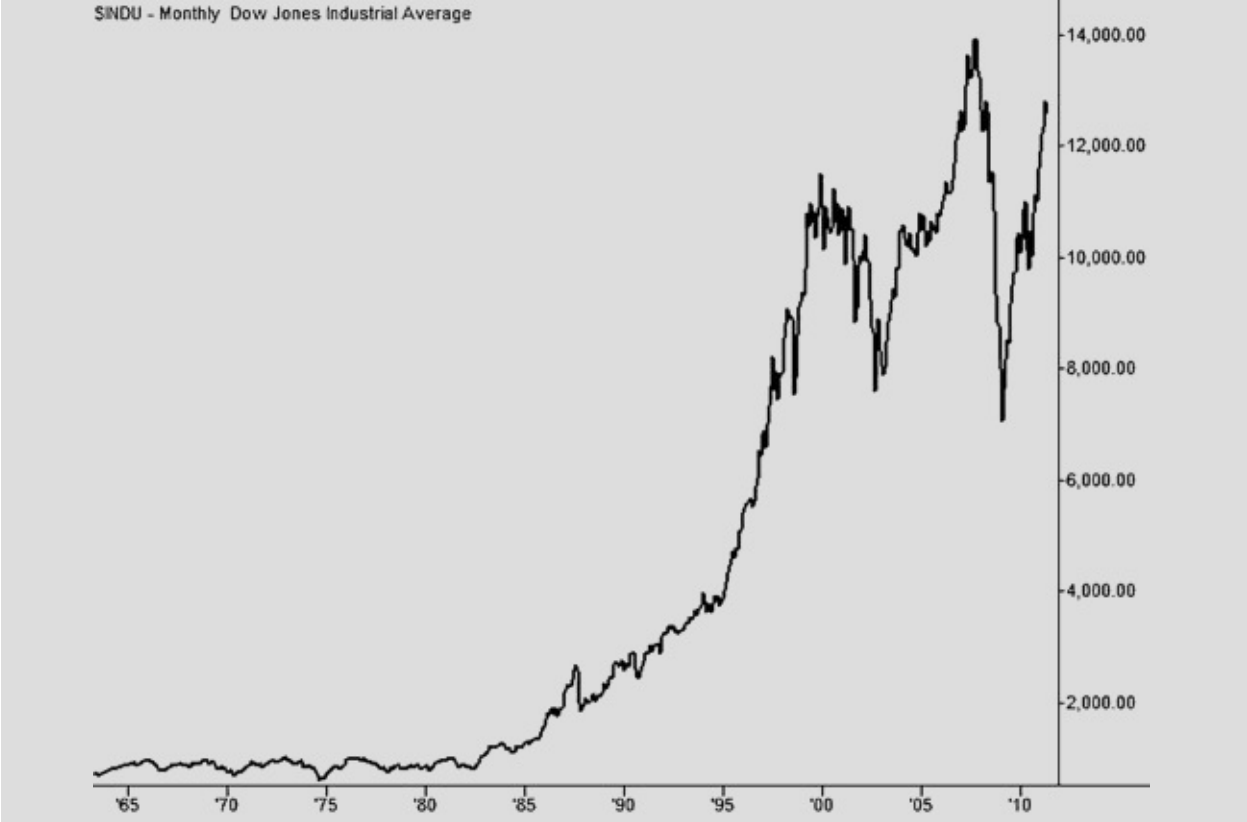
enhancement. Consistency is also very important, for two separate reasons. First, consistency reduces the time required to orient between charts. It is not unusual for me to scan 500 charts in a single sitting, and I can effectively do this by spending a little over a second on each chart. This is possible only because every one of my charts has the same layout and I can instantly orient and drill down to the relevant information. Consistency is also especially important for the developing trader because part of the learning process is training your eye to process data a certain way. If you are forever switching formats, this learning curve becomes much longer and steeper, and the development of intuition will be stymied. Keep the same format between all markets and time frames, and keep the setup of all of your charts as consistent as possible.

### Chart Scaling: Linear versus Log

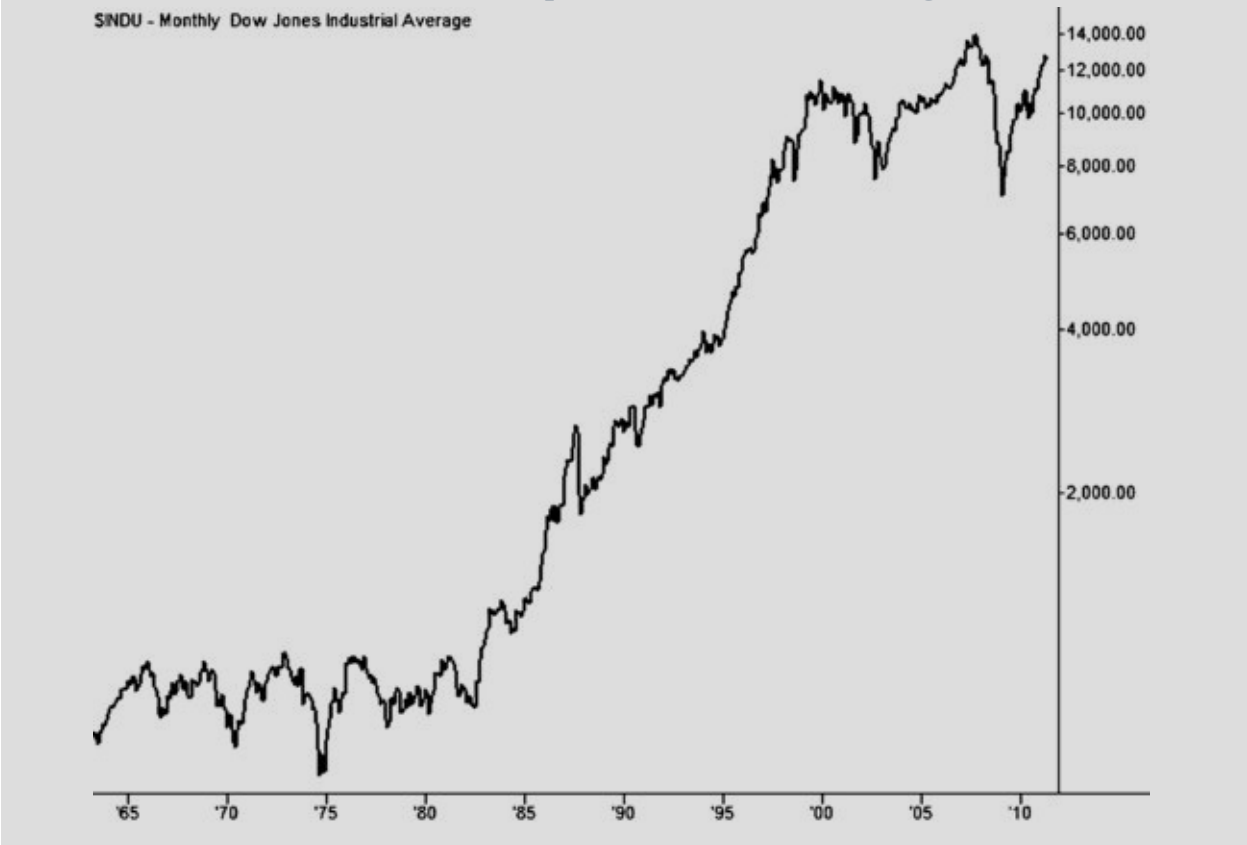
The one exception to the principle of keeping charts consistent might be in the case of very long-term charts spanning multiple years, or shorter-term charts in which an asset has greatly increased in value (by over 100 percent). In these cases, the vertical axis of the chart should be scaled logarithmically (called “semi-log” in some charting packages) to better reflect the growth rate of the market. The idea behind a *log scale chart* is that the same vertical distance always represents the same percentage growth regardless of location on the axis.

On a very long-term chart, *linearly scaled charts* will often make price changes at lower price levels so small that they disappear and they are completely dwarfed by price changes that happened at higher levels. The linear scale also magnifies the importance of those higher-level price changes, making them seem more violent and significant than they actually were. Compare [Figure 1.1](#) and [Figure 1.2](#), two charts of the long-term history of the Dow Jones Industrial Average (DJIA), especially noticing the differences between the two charts at the beginning and end of the series. They seem to tell completely different stories. The first chart shows a flat and uninteresting beginning followed by violent swings

**[FIGURE 1.1](#)** Nothing Seems to Matter Before 1985: DJIA on a Linear Scale



**FIGURE 1.2** Investors' Actual Experiences: DJIA on a Log Scale



near the right edge of the chart, while the second, the log scale chart, shows more consistent swings throughout. Over this long history, the log scale chart is a much more accurate representation of what market participants would have experienced at any point on the chart. Remember, as a rule of thumb, there are two times when log scale charts should be used: any time you have greater than a 100 percent price increase on a chart, and for any chart showing more than two years of data, whether on daily, weekly, or monthly time frames.

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## Choosing Time Frames

Discretionary traders must clearly choose and define the time frame within which they will trade, and this choice of time frames is tied into deeper questions of personality and trading style. Most of the trading ideas and principles we examine in this book can be applied to all markets and all time frames, with some adjustments, but most traders will probably find themselves best suited to a specific set of markets and time frames. Traders switching time frames or asset classes will usually undergo a painful adjustment period while they figure out how to apply their tools in the new context. For now, let's leave these important considerations behind and focus on only the mechanical issues of setting up charts to cover multiple time frames. In the end, your charts must be a tool that serves your trading style, not the other way around.

Many authors have written about the advantages of combining multiple time frames. Multiple time frames can provide context for and inform patterns on a single time frame; skilled use of multiple time frames allows traders to better manage risk and to increase the expectancy of their trading plans. Nearly all technical traders consider action and structure in other time frames, though they do this in a variety of ways. Some traders are able to infer this information from a single chart, while many others prefer to actually look at multiple charts of the same market with each chart showing a different time frame. In a scheme like this, the primary time frame of focus is called the *trading time frame (TTF)*. A *higher time frame (HTF)* chart provides a bigger-picture perspective, while a *lower time frame (LTF)* chart is usually used to find precise entry points. Other variations, with up to five or six charts, are possible, and there are many traders who use only a pair of charts. Last, though the term *time frame* seems to imply that the x-axis of the chart will be a time scale (minutes, hours, days, etc.), the same proportional relationships can be applied to tick, volume, or any other activity-based axis scale on the x-axis.

In general, time frames should be related to each other by a factor of 3 to 5. There is no magic in these ratios, but the idea is that each time frame should provide new information without loss of resolution or unnecessary repetition. For instance, if a trader is watching a 30-minute chart, a 5- or 10-minute chart probably provides new information about what is going on inside each 30-minute bar, whereas a 1-minute chart would omit significant information. Using a 20-minute chart in conjunction with a 30-minute chart probably adds no new

information, as the two charts will be very similar. One lesser-known relationship is that all vertical distances on charts scale with the square root of the ratio of the time frames. This has implications for risk management, profit targets, stops, and volatility on each time frame. For instance, if a trader has been trading a system on 5-minute charts with \$0.25 stops and wishes to transfer that to 30-minute charts, the stops will probably need to be adjusted to about \$0.61 ( $\$0.25 \times \sqrt{30/5}$ ). This relationship does not hold exactly in all markets and all time frames, but it is a good rule of thumb and can give some insight into the risks and rewards of other time frames.

The rule of consistency also applies to choice of time frames. Once you have settled on a trading style and time frame, be slow to modify it unless you have evidence that it is not working. This story will be told with the most clarity and power in a consistent time frame. In addition, if you catch yourself wanting to look at a time frame you never look at while you are in a losing trade, be very careful. This is often a warning of an impending break of discipline.

## Bars, Candles, or Other Choices

Most traders today seem to be focused on using candlestick charts, but the more old-fashioned bar charts should not be overlooked. Both chart types display the same data points but in a slightly different format; they have the same information on them, so one is not better than the other. The main advantage of bar charts is that they can be cleaner visually and it is usually possible to fit more data in the same space because bars are thinner than candles. For many traders, the colors of candlestick charts make it easier to see the buying and selling pressure in the market, providing another important visual cue that helps the trader process the data faster.

Another issue to consider, particularly with intraday charts, is how much importance should be attached to the closing print of each period. Historically, this was *the* price in many markets, and it still has significance in some contexts. Profits and losses (P&Ls), margins, and various spreads are calculated off daily settlement prices; exchanges have complex procedures for calculating these prices, which are rarely simply the last print of the session. However, times are changing. In currencies, most domestic platforms report a closing price sometime in the New York afternoon, and we have to wonder just how important that price is for the Australian dollar or the yen, whose primary sessions ended many hours earlier. As more and more markets go to 24-hour sessions, the

importance of this daily settlement price will continue to decline. The problem is even more significant on intraday bars, bar as closing prices on intraday bars are essentially random samples and may differ from platform to platform. If you are trading candlestick patterns, which attach great significance to the close, you are trading the patterns you see on your screen. If you switched to a different data provider, the data might be time-stamped differently, and you would see different patterns. How important can those patterns really be?

# INDICATORS

Indicators are calculated measures that are plotted on price charts, either on top of the price bars or in panels above or below the bars. There are many different indicators in common usage, and traders have a wide range of approaches and applications for these tools. Some traders are minimalists, using few or no indicators at all, while others will use multiple indicators in complex relationships. In addition, some indicators are extremely simple calculations, while others are very complex, perhaps even using complex calculations borrowed from other applications such as radar or digital signal processing. There is certainly no one right way to set up or use indicators, but, here again, consistency is paramount. Few traders find success by constantly switching between indicators. There is no holy grail or combination of tools that will lead to easy trading profits.

One other important point is that you must intimately understand the tools you use. Know how they will react to all market conditions, and know what they are saying about the market structure and price action at any time. Focus on tools that highlight and emphasize important elements of market structure, because your main focus should be on the price bars themselves. Intuition comes from repeated exposure to structured data in well-planned and consistent contexts; make your chart setups serve this purpose. Much of this book—and Chapter 7 and Appendix B in particular—focuses on these ideas and reinforces the importance of fully understanding every tool you use.

## THE TWO FORCES: TOWARD A NEW UNDERSTANDING OF MARKET ACTION

*Price action* is a complex and imperfectly defined subject. There are many traders who believe that price action is something nebulous that cannot be quantified. To other traders, trading price action means trading the patterns of price bars on charts, without the addition of indicators or other lines. In this book, price action simply means how markets usually move, which, frankly, is, usually randomly. Be clear on this point: markets are *usually* random and most of the patterns markets create are also random. However, we can sometimes identify spots where price movement is something less than random and is

somewhat more predictable, and these less-than-random spots may offer profitable trading opportunities.

*Price action* is the term used to describe the market's movements in a dynamic state. Price action creates *market structure*, which is the static record of how prices moved in the past. Think about a finger tracing a line in the sand. Market structure is the line left in the sand; price action describes the actual movements of the finger as it drew the line. In the case of a finger, we would talk about smooth or jerky, fast or slow, and lightly or with deep pressure into the sand. In the case of actual price action, we would look at elements such as: How does the market react after a large movement in one direction? If aggressive sellers are pressing the market lower, what happens when they relax their selling pressure? Does the market bounce back quickly, indicating that buyers are potentially interested in these depressed prices, or does it sit quietly, resting at lower levels? How rapidly are new orders coming into the market? Is trading one-directional, or is there more two-way, back-and-forth trading? Are price levels reached through continuous motion, or do very large orders cause large jerks in prices? All of these elements, and many more, combine to describe how the market moves in response to order flow and a myriad of competing influences.

In the past, many authors have used a wide range of analogies to describe financial markets. Ideas and models have been borrowed from the physical and mathematical sciences, so terms like momentum, inertia, vectors, and trajectories have crept into the vocabulary. More recently, some thinkers have applied the tools of digital signal processing to market data, so we have a new vocabulary that includes cycles, transforms, and waves. Markets are confusing enough in their natural state; some of the analytical frameworks traders use add to the confusion. I propose a simpler model: that market action appears to be the result of two interacting forces: a *motive force* that attempts to move price from one level to another and a *resistive force* that opposes the motive force. These forces represent the sum of all analysis and decision making at any one time.

The normal state of existence in most markets most of the time is equilibrium. The two forces are in balance. Buyers and sellers have no sharp disagreement over price; the market may drift around a central value, but there are no large trends or price changes. Market action in this environment is highly random; if we were to analyze this type of action statistically, we would find that it conforms very closely to a random walk model. This is also precisely the type of environment that technically motivated traders must strive to avoid, as there can be no enduring statistical edge in a randomly driven market.

Markets in this state of equilibrium will have varying degrees of liquidity and ability to absorb large orders. Eventually, there is a failure of liquidity on one side, and the market makes a sudden, large movement in one direction. Perhaps this movement is in response to new information coming into the market, or it can simply be a result of a random price movement setting off further movement in the same direction. No matter the reason behind the movement, in theoretical terms, the motive force has, at least temporarily, overcome the resistive force. In the parlance of technical analysis, this type of sharp movement is called an *impulse move* or a *momentum move*.

From this point, there are basically two options. In many cases, the resistive force is quickly able to overcome the motive force, and the market finds balance again. This may be at a new level, or prices may immediately retrace their course and return to the preshock levels. Psychologically, market participants have chosen to view this large price movement as a temporary aberration, and new liquidity comes into the market that will dampen any future distortion. However, it is possible that the large price spike will lead to continued movement in the same direction. In this scenario, a feedback loop develops where the market makes a large movement, which, in turn, provokes another large price movement, and the market trends.

In most cases, the market structure of this trending movement will be a series of directional moves alternating with nondirectional periods in which the market essentially rests and absorbs the previous move. In the bigger picture, the motive force has overcome the resistive force, but there is still a subtle interplay of balance and imbalance on shorter time frames. Prices trend because of an imbalance of buying and selling pressure. (This is often, but not always, indicative of nonrandom action, as trends exist in completely random data.) Once prices are trending, at some point they will have moved far enough that the resistive force is once again able to balance the motive force, and the market again finds a new balance.

This interplay of motive and resistive forces, from a very high-level perspective, is the essence of price action and the root of technical analysis. The patterns we see in the market are only reflections of the convictions of buyers and sellers. They are useful because we can see them, trade them, and use them to define risk, but always remember that they are manifestations of deeper forces in the marketplace.

## PRICE ACTION AND MARKET

# PRICE ACTION AND MARKET STRUCTURE ON CHARTS

Charts are a way to organize and to structure the flood of information the market generates and can reveal clues about the strength of the underlying forces. There is no one right way to read a chart, but I will share the basic elements of an approach that has been very useful to me over the years. These tools and this framework have shown themselves to be reliable time and time again, but these are *my* tools and *my* method. You must make them *your own* tools. Use everything here as a collection of ideas from which you can begin to build your own approach to the markets.

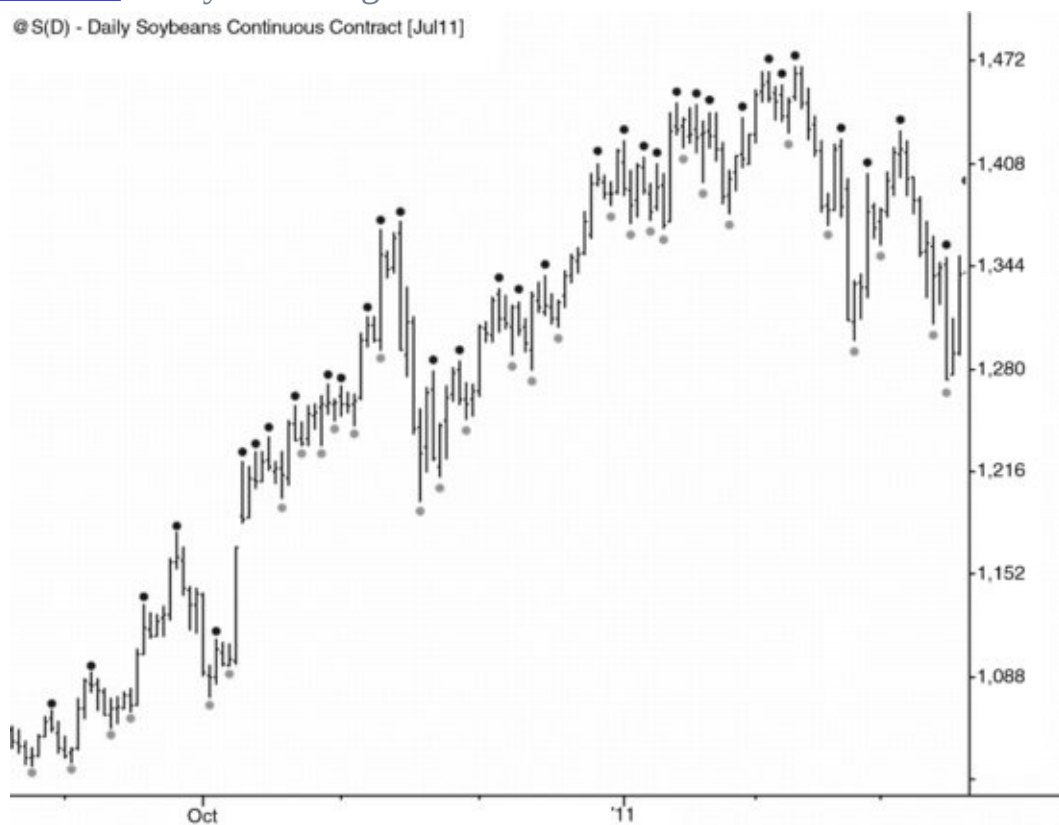
*Market structure* refers to the static structure visible on charts, made up of previous movements in the market and places where those movements stopped. The key elements of market structure are *pivot points* and the *swings* connecting them, both of which may be evaluated either in price (the vertical axis on a chart), in time (the horizontal axis), or in a combination of the two.

*Price action* is the dynamic process that creates market structure. Price action is also more subjective; in most cases, market structure is concrete. Market structure is static and is clearly visible on a chart, but price action usually must be inferred from market structure. Also, both are specific to time frames, though price action is often visible as the market structure of lower time frames. These definitions and their implications will become clear over the next chapters.

## Pivot Points

The basic units of market structure on any time frame are pivot highs and lows (also called swing highs or lows). A *pivot high* is a bar that has a higher high than the bar that came before it and the bar that comes after it. At least in the very short term, the bar's high represents the high-water mark past which buyers were not able to push price, and can be considered a very minor source of potential resistance. A *pivot low* is the same concept inverted: a bar with a lower low relative to both the preceding and the following bars. [Figure 1.3](#) shows a chart with every pivot high and pivot low marked. Note that it is possible for a bar to be both a pivot high and a pivot low at the same time, and that pivot highs and pivot lows are very common.

**FIGURE 1.3** Every Pivot High and Low



Another name for the type of pivot in [Figure 1.3](#) is a *first-order pivot*. Though these first-order pivots do sometimes coincide with major turning points in the market, they are so common that they cannot be extremely significant. Every major turning point, by definition, comes at a pivot, so it is easy to overstate their importance; once you see a chart with every possible pivot marked, it



becomes obvious that this structure is so common that it is nearly insignificant. It is also interesting to consider that most pivots on one time frame mark significant market structures on lower time frames, but this is a complication that we will save for later. As a stand-alone concept, first-order pivot highs and lows have limited utility; their power comes from their relationship to other pivots and their ability to define market structure. They are like a single brick in a building—not that interesting or useful by itself.

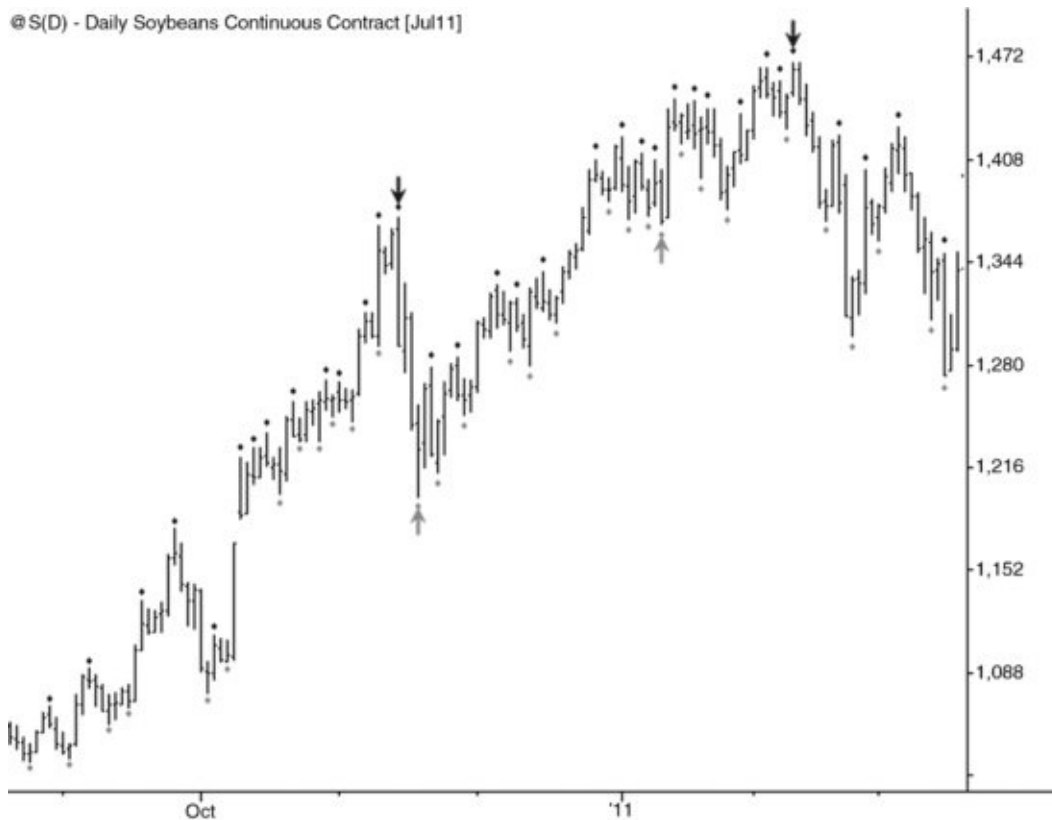
*Second-order pivot* highs (also called intermediate-term pivots) are first-order pivot highs that are preceded and followed by lower first-order pivot highs; again, this structure is inverted for second-order pivot lows. In [Figure 1.4](#), notice that these second-order pivots begin to define some more significant structural points. It is much more likely that second-order pivots will come at important turning points, but remember that there is no predictive power because this is a pattern that is defined post hoc. They always look far more significant in the middle of a chart than they do on the right edge. It is also worth noting that there is no law that says second-order pivot highs and lows have to alternate; it is possible to have three second-order pivot highs or lows in a row. If you are going to use this concept systematically, make sure your rules plan for this situation.

**FIGURE 1.4** Second-Order Pivots (Marked with Arrows) Define More Important Market Structure



Predictably, this concept can be extended on many levels, but in actual practice, most of our focus is on third-order pivots, which usually mark major inflections (see [Figure 1.5](#)). Almost without exception, a trader who could identify these third-order pivots in advance would have nearly perfect entries on both sides of the market. This cannot be done, but it does point out that these third-order pivots delineate the market structure very clearly. It is worth your time to train your eye to see these pivots quickly; the value in this structure is in providing context for the market's movements. Once you understand the basic ideas behind this concept, it is probably a good idea to not be too rigid with these structures and definitions. If you see something on a chart that is fulfilling the basic role of one of these structures but for one reason or another does not exactly fit the criteria, it often makes sense to bend the rules for that case. The goal is to define meaningful market structure, not to blindly follow a set of rules.

**FIGURE 1.5** Third-Order Pivots Usually Define the Most Important Market Structure on Any Time Frame



It also should be obvious that this is a backward-looking analytical method. This is a problem with all swing or wave methods: they offer fantastic *explanations* of past market action, but have little or no predictive power at the right edge. This pivot structure is not intended to be a trading methodology; it is context. For instance, a sharp down move might be interpreted differently if it comes at a point where the market had been making consistently higher second-order pivot highs and lows compared to an environment where they were more randomly distributed. As another example, a movement that penetrates a significant third-order pivot high or low can sometimes significantly change the market environment. The purpose of this tool is to provide that structure and context, not actual trade entries.

## Length of Swing

Once we have defined the second- or third-order pivot structure of the market, we can connect the pivot highs and lows with lines to outline the swing structure of the market. (In the spots where highs and lows do not alternate, take the lowest low of the series or the highest high of the series as the anchor point.) If this type of analysis is new to you, it is probably a good idea to draw the structure on a few hundred charts until it becomes somewhat intuitive; eventually you want to be able to glance at a chart and see this structure immediately. Like everything else, it gets easier only with continued practice and familiarity. It is impossible to overstate the importance of this skill.

Once the individual swings are delineated, we can start to consider what the market structure actually tells us about the balance of buying and selling pressure in the market. The core concepts are simple:

- When buyers are stronger than sellers, upswings will be longer, both in price and in time, than downswings.
- When sellers are in control, downswings will be longer than upswings.
- Significant support and resistance levels are visible as rough areas (not precise lines) beyond which pivots have been unable to penetrate.
- When there is relative equilibrium, there is no clear pattern to the swings.

There is nothing mysterious about market structure and price action. They grow from these simple patterns, which then combine in a nearly infinite number of variations. Focusing on the variations is difficult because they are legion—it is an exercise in futility to try to catalog all of the complexities and variations of patterns, though this attempt has been repeated many times throughout history. Understand the root. Understand the market structure. There are a handful of common patterns and templates that provide the foundation for most of the significant patterns in the market. We will spend much of the rest of this book refining these templates, looking at specific ways to trade around them, and considering how to manage the risk of those trades. Here is a brief introduction to a few of the most important of these patterns. Commit them to memory; you will be seeing them again.

[Figure 1.6](#) shows the basic uptrend template: upswings are longer than the downswings, creating a consistent pattern of higher pivot lows and higher pivot highs. This pattern, inverted, would become a downtrend.

**FIGURE 1.6** An Uptrend



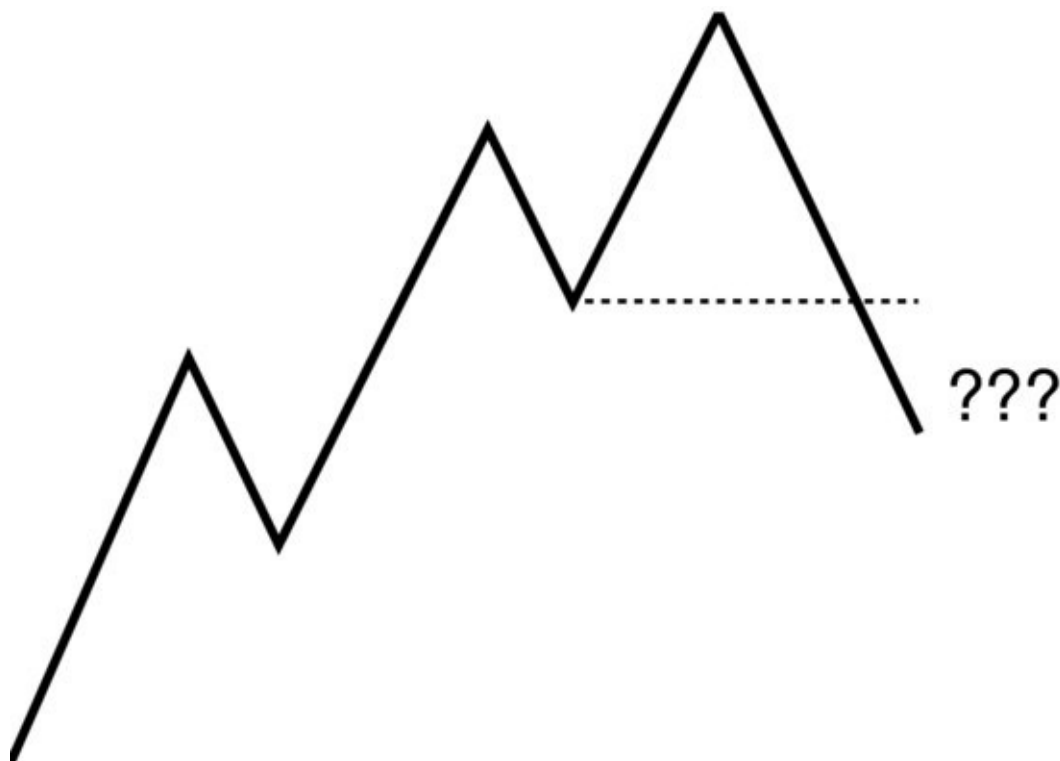
[Figure 1.7](#) shows a market in a trading range. This is a random environment in which the conviction of buyers and sellers is relatively equal and there is no clear pattern to prices. There can be sudden, sharp moves within trading ranges, but they are often more or less unpredictable.

**FIGURE 1.7** A Trading Range



[Figure 1.8](#) shows a pattern that gives a warning of a break in an uptrend's established pattern. This is often the first step of a trend change, but you cannot trade based only on this pattern; this is a warning sign to pay careful attention to what comes next. There is great value in knowing when patterns have broken, as this suggests a potential change in the balance of buyers and sellers in the market.

**[FIGURE 1.8](#)** A Break in the Uptrend Pattern



[Figure 1.9](#) shows an example of a classic breakout above resistance. This suggests one of two things: On one hand, markets in trading ranges (see [Figure 1.7](#)) are highly random and this type of move may be nothing more than a random (and temporary) move beyond previous levels. On the other hand, it could be an early warning that buying pressure is now stronger than selling pressure in this market, and it is possible that prices could trend significantly higher from this point.

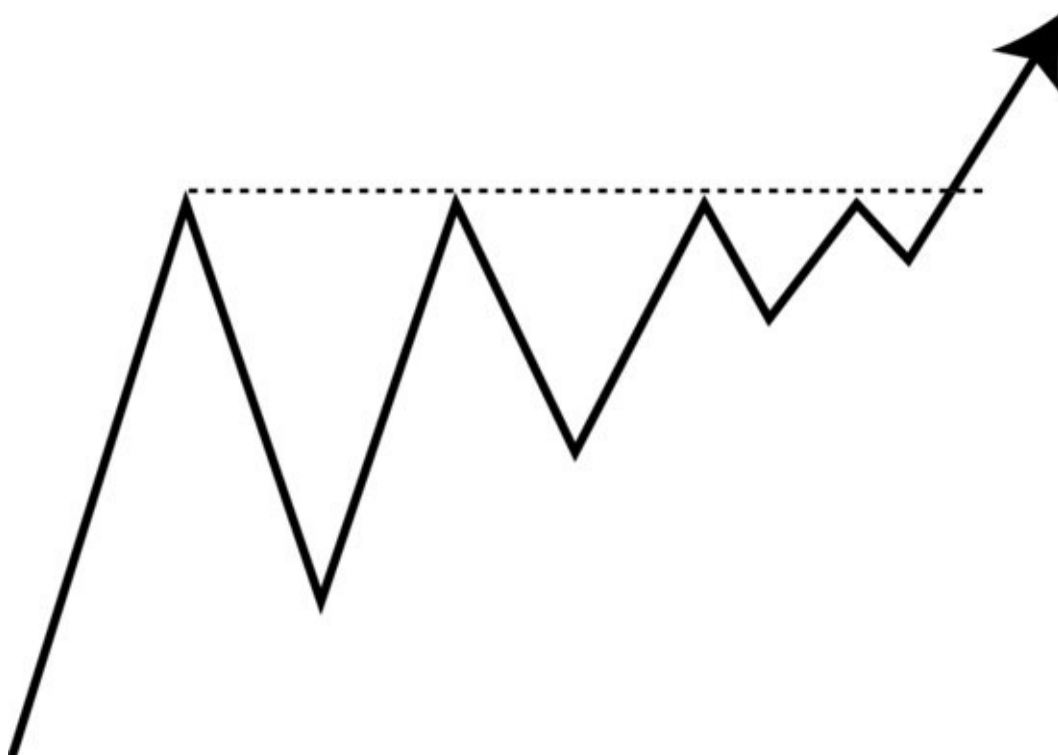
**FIGURE 1.9** A Breakout of the Trading Range



[Figure 1.10](#) shows a particular pattern that often precedes the best breakouts. If buyers are able to hold the market higher on successive declines, a pattern of higher pivot lows pressing against the resistance area will result. This suggests real buying conviction supporting the move and the potential breakout.

**[FIGURE 1.10](#)** A Breakout Preceded by Higher Lows into Resistance





This is certainly not a complete encyclopedia of swing patterns, but it does highlight the basic concept: the length of swings and the relative position of pivot points can give insight into the character of the market.

## Market Structure versus Traditional Chart Patterns

There are two broad schools of thought in technical analysis. One approach is to catalog every possible chart pattern and variation of those patterns. A trader using this approach might look for wedges, pennants, flags, boxes, ledges, head and shoulders patterns, and double tops and bottoms—these are only a few of the traditional patterns, and many more have worked their way into modern practice. These traders spend a lot of time studying these patterns and variations, and they usually have specific trading plans for each pattern. Richard Schabacker was the first writer to codify this approach, in the late 1920s, and it was crystallized in his landmark 1932 *Technical Analysis and Stock Market Profits*.

Upon his early death in 1935, his brother-in-law, Robert Edwards, took over the company he had founded and continued his work of market analysis. Later, Edwards teamed up with John Magee, and the two wrote *Technical Analysis of Stock Trends* (1948; 4th ed., 1964), which is now considered to be the ultimate, authoritative source on chart patterns. The Schabacker approach (which is not known by that name because few people know the history behind Edwards and Magee) is the predominant school of modern technical analysis, but there is another path.

The second broad school of technical analysis is Richard Wyckoff's approach. The core concept here is that chart patterns have very limited utility, and what predictive power they do have is highly dependent on the context in which they appear. The only real purpose of chart patterns is to quantify and to define the buying and selling pressure in the market. In many cases, traders using both approaches will arrive at similar conclusions. These are two different means to the same end, but many traders find a richness and depth in the Wyckoff approach that surpasses a simplistic focus on chart patterns. We trade the underlying buying and selling imbalance, which is what will move price

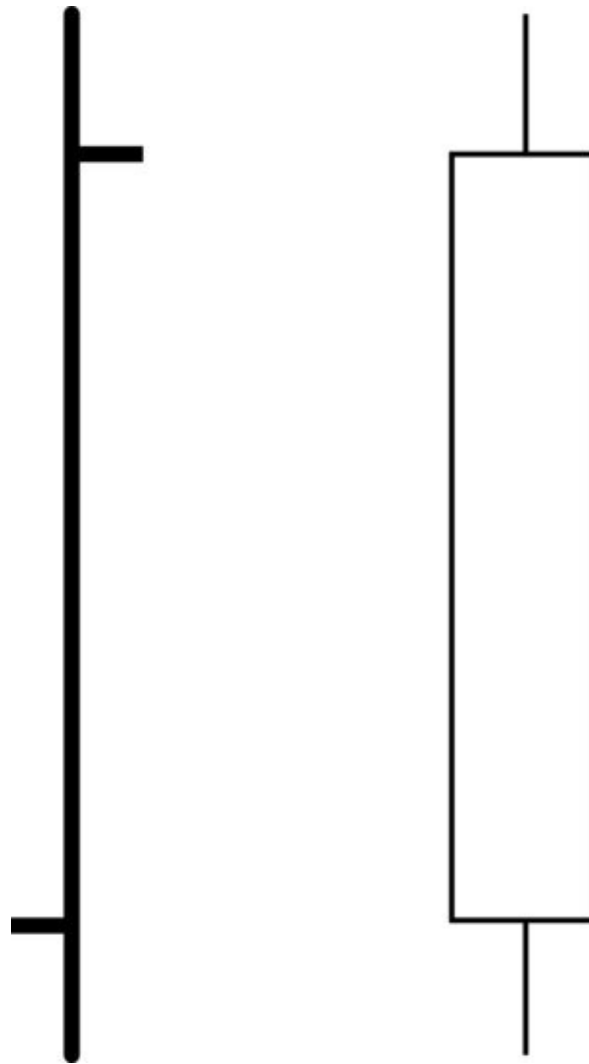
chart patterns. We trade the underlying buying and selling imbalance, which is what will move price in our favor if we are correct.

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## Reading Inside the Bars

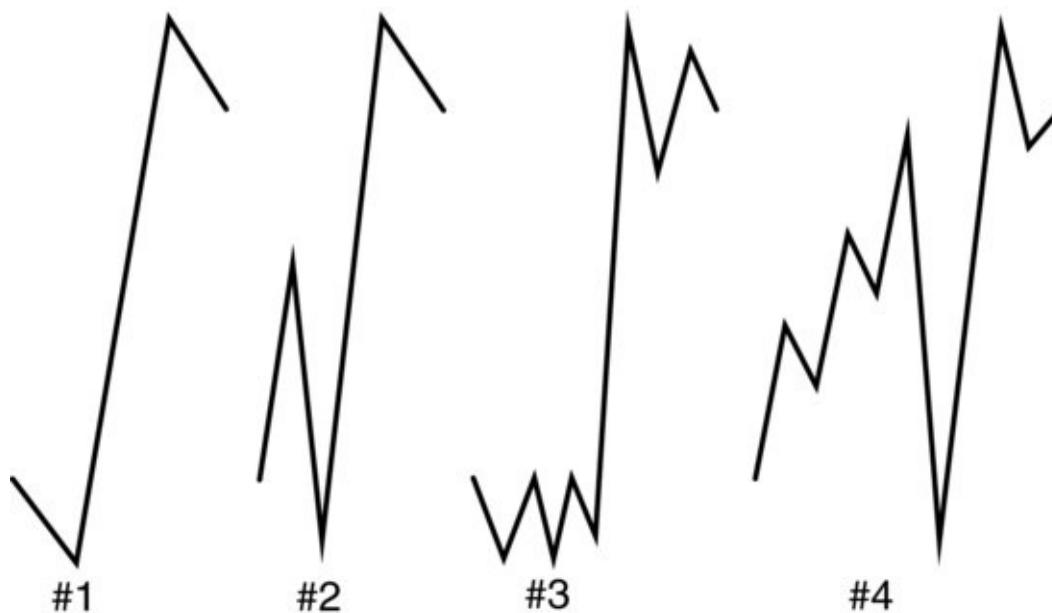
One skill that is often overlooked in chart reading is the ability to look at a bar on a chart and to infer what price action might have created that bar. In practical terms, this means being able to look at a bar on one time frame and immediately understand the most likely lower time frame scenarios that could have created that bar. In almost every case, there are multiple possibilities, but some are much more likely than others. It is not necessary to be 100 percent correct on this; sometimes we will simply guess wrong, but working to develop this skill will greatly increase the trader's intuitive grasp of price charts. For instance, consider the single candle in [Figure 1.11](#) with an empty body (meaning that the close was higher than the open) and with moderately small shadows on the top and bottom. There are three things we know with certainty about this candle: the close was higher than the open; at some point, the market traded lower than the open; and, at some point, it traded higher than the close.

**FIGURE 1.11** A Candle Is a Snapshot in Time—How Was This Candle Formed?



Most people with a little bit of trading experience would assume the candle opened, traded down to put in the low, trended up to make a high, and backed off to close under that high. This is the most obvious possibility (scenario #1 in [Figure 1.12](#)), but there are many others, some of which are also shown. Traders developing a sense for price action need to spend a lot of time contemplating all of the lower time frame scenarios that could produce each bar. Being locked into a single interpretation without considering the context can blind us to what might really be going on in the market.

**[FIGURE 1.12](#)** Some of the Many Possibilities of Lower Time Frame Action That Could Have Produced [Figure 1.11](#)

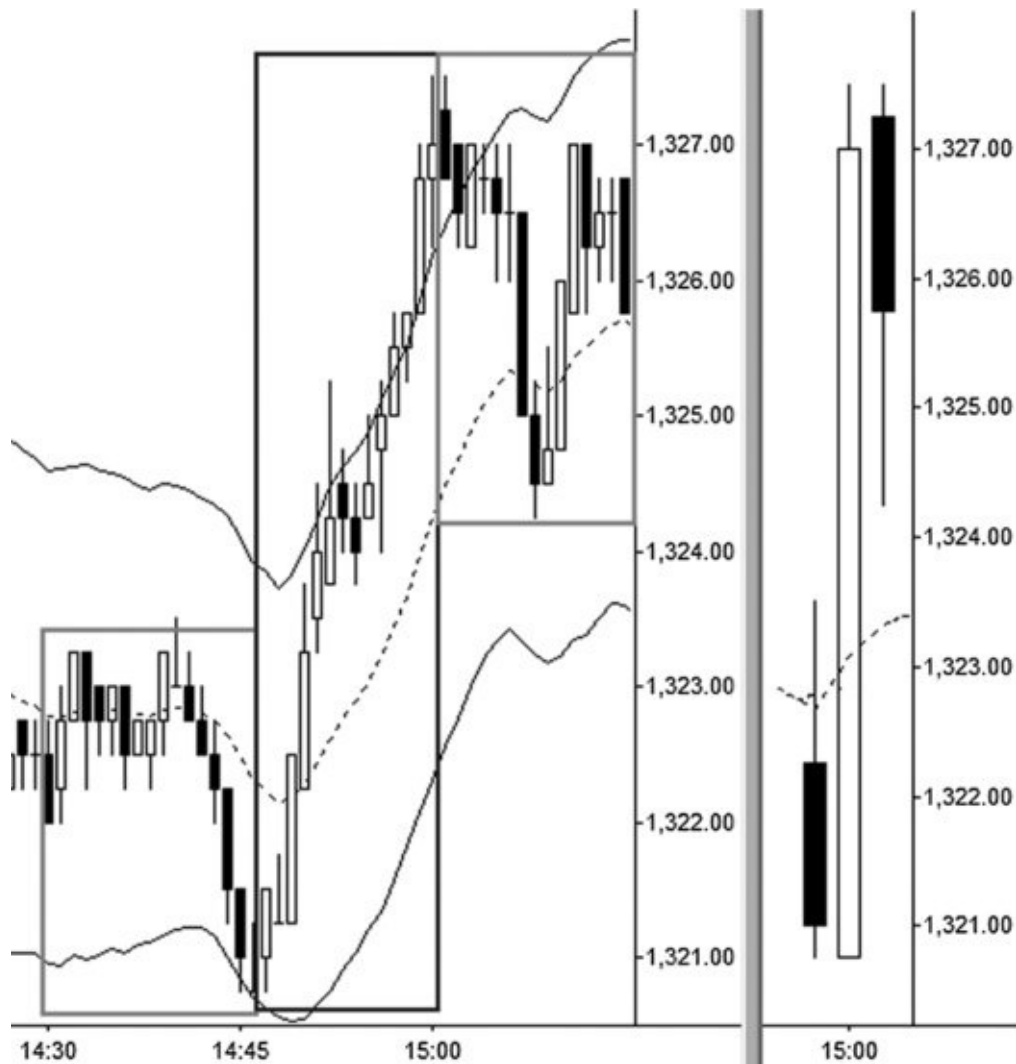


Though charts contain a lot of noise and random action, there are points where structures within individual bars, or a small set of bars, are very important. One simple pattern to think about is that the location of the closing point relative to the high and the low of the bar may give some insight into the buying or selling conviction within that bar. For instance, a close near the high of the bar usually shows that buyers were in control going into the end of the time period. Yes, there are other possibilities and patterns that could have created the close near the high, but, more often than not, buyers were in control. Conversely, closes near the middle of the bar, visible as long shadows on candle charts, show a certain neutrality and lack of conviction. It is also worth considering the extreme case where several bars in a row close on their absolute highs. Many traders would assume that this is indicative of a very strong market, but, statistically, this condition more often indicates short-term exhaustion and at least a slight reversal—be careful of entering with the trend after several bars close on their highs.

## Trend and Trading Range Bars

Large bars relative to recent bars on one time frame most likely contain trends on the lower time frame, especially if the close and open are near opposite ends of the bars. Small bars on one time frame are probably trading ranges on lower time frames, and, in general, bars that have their opens and closes nearer to the center point of the bar are also more likely to have been trading ranges. This is a simple concept, but understanding this dynamic is a key to building intuition about price action and the interaction of time frames. There is much subtlety here, but these are the essential concepts. [Figure 1.13](#) shows lower time frame trends and trading ranges within the three boxes in the left panel that correspond to the three higher time frame bars in the right panel. Do not accept price bars at face value. Always think deeply about what is going on behind the scenes, on lower time frames.

**[FIGURE 1.13](#)** One-and 15-Minute S&P Bars, Showing Lower Time Frame Trading Range and Trend within Higher Time Frame Bars

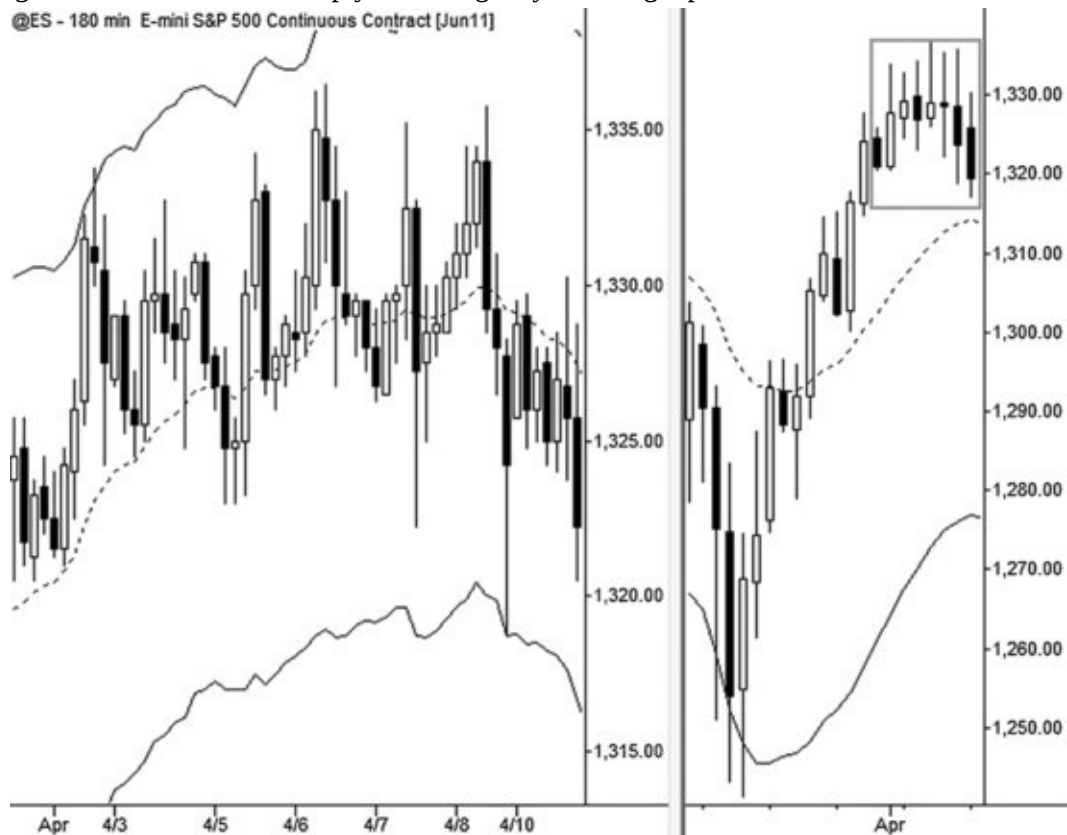


The right panel of [Figure 1.14](#) shows a daily chart of the E-mini S&P 500 futures at a time when the trend on that time frame was losing momentum. What are the signs on this time frame that suggest a loss of momentum? Each bar continues to make a higher high up into mid-April, but at a declining rate. We could characterize these as “reluctant highs,” to indicate waning momentum. In addition, the bars are becoming smaller, indicating that trading interest is drying up, and there are no more large trend bars (that open near the lows and close near the highs) in April. On each of the multiple time frame charts in this book, the lower time frame in the left pane expands on the highlighted area of the higher time frame chart on the right. In this case, the lower time frame tells the same story of loss of momentum, but in much more vivid detail. There are multiple failure tests above the highs, as the market spikes to new extremes and is unable to find the buying pressure to support itself there. Note that this reversal on the lower time frame could simply be subsumed into a trading time

frame consolidation, but the lower time frame clearly shows the change in the buyers' conviction.

**FIGURE 1.14** Three-Hour (Left Pane) and Daily S&P 500 Futures Charts

Notice that the lower time frame shows multiple tests and failures at the high. This level of resolution is lost on the higher time frame, which simply shows a gently rounding top.



Many traders focus on trading *pullbacks*. A pullback (also called a *flag* or *consolidation*) is a move against the prevailing trend. For instance, a pullback in a downtrend bounces against the trend and is an opportunity to enter a short position; a pullback in an uptrend is a decline. Most traders train themselves to see these structures easily, but pullbacks can also be hidden in higher time frames: one or two small bars that hold near the extreme of a trend leg (near the lows in a downtrend or the highs in an uptrend) are often a complete lower time frame pullback. As such, these simple one-or two-bar pullbacks (*high and tight flags*) are tradable structures in very strong trends, as in [Figure 1.15](#). This is a common and important pattern.

**FIGURE 1.15** The Small Bars on the 15-Minute EURUSD Chart (Right Pane) Hide a More Significant Pullback on the 2-Minute Lower Time Frame





Another important pullback pattern in an uptrend has several bars with downward closes separated by a single bar with an upward close. This pattern usually hides a complex pullback on the lower time frame, which is a three-legged structure consisting of an initial pullback followed by a small, failed attempt to resume the initial trend. From that second leg, the market turns down again to make another countertrend leg that is usually approximately as long as the first one. This is a very common pattern, especially in extended trends, and will be explored in much more detail later. [Figure 1.16](#) shows an example of a two-legged complex pullback. On the higher trading time frame, it is not so obvious and has to be inferred from the presence of one or two with-trend candles in the middle of the pullback, but the complete structure is clearly visible on the lower time frame.

**FIGURE 1.16** The Daily Chart of X (Left Pane) Shows a Clear Two-Legged Complex Pullback

The weekly chart hints at this structure, but it must be inferred from the single upward-closing candle in the

middle of the pullback.



One of the quantifiable tendencies of price motion is for markets to make directional moves out of periods of contracted volatility. Even if the normal expectation for a market is mean reversion and reversal (as it is in the short term for equities), there is usually at least a slight edge for continuation out of areas of volatility compression. One simple way to quantify volatility contraction is by looking for inside bars, which are bars whose entire range is enclosed within the range of the previous bar—in other words, a bar whose high is equal to or lower than the previous high and whose low is above or equal to the previous low. A series of multiple inside bars on one time frame usually contains a triangle on the lower time frame, which is a visual pattern that strongly suggests volatility contraction. Trading *within* triangles is usually a losing proposition, as the market is in equilibrium and the actual movement within the pattern is highly random. However, they can set up good breakouts with expectations for strong, extended moves away from the pattern. It is easy to overlook multiple inside bars (see [Figure 1.17](#)), but this is a powerful and subtle pattern that is worth some attention.

**FIGURE 1.17** Multiple Inside Bars on the Hourly Chart of the E-mini S&P 500

## Futures (Right Pane) Hide a Clear Lower Time Frame Triangle on the 10-Minute Chart



The examples in this section were deliberately chosen to be less than perfect because it is important to start thinking about these concepts in the context of actual market action, which is always less clear and noisier than we wish. Remember that charts are artificial structures that we impose on market data. They are useful because they organize the data, but we are always dealing with a trade-off between effective summarization and loss of detail. There is no perfect answer, but many of the limitations can be overcome if we work to constantly remember what the chart actually is, and to try to understand the buying and selling pressure that each bar represents. The chart is not the market; the chart is a *representation* of the market.

## CHARTING BY HAND

I started trading in the 1990s, in the twilight years of the old, classic paper chart books. A book would come in the mail at the beginning of the week, printed on newsprint; each day it was up to the trader to track down prices for each of the markets and update the charts by drawing a new price bar. At the beginning of the next week, a new book would arrive with the past week's prices filled in, and the process would repeat. Actually, in my very early trading days I did not even have the chart book, but I bought a pad of graph paper, went to the library, and started building charts from histories I found in back issues of newspapers. I did not realize the value of what I was doing at the time, but this process immersed me in patterns as they were emerging. There is something about physically drawing lines that engages a different part of the brain than looking at a screen does. Because of this work, I assimilated patterns quickly and developed a sense of the forces at work behind the patterns early in my development. When you are drawing open, high, low, and close on each price bar, you will spend time during the day wondering what new configurations could appear at the end of the day, and thinking about how the day's trading might unfold to create those patterns.

Most readers are probably shaking their heads and laughing at this point, thinking that this is a quaint and hopelessly anachronistic practice, but I beg to differ. Modern computer charting has the advantage of breadth. It would simply not be possible to review a large number of charts every day without the aid of a computer to generate those charts; however, there is still great value in pencil and paper. This is not a practice that will reward you with immediate results and profits; it works on a much deeper and more profound level of perception, and it takes time. I would suggest that interested traders commit to doing this for a period of not less than two months, consistently, and then evaluate the impact of the exercise on your ability to read the market. I know of no better exercise to help a developing trader assimilate the patterns of the market and to begin building intuition. You will be amazed at the transformation in your vision.

There are two specific ways to do this exercise. One is to simply plot standard bar or candle charts, by hand, for whatever time period is under consideration. Every trader can at least do daily charts, but intraday traders might be able to do 15-to 30-minute time frames. Lower time frames will give much more exposure to patterns, but the time for contemplation is reduced. Above all, you want to pick a time frame that will allow you to make an unflinching commitment to this



on pivots and length of swings.) It is also possible to define the reversal with other tools, such as reversing a specific multiple of the average range off the previous swing, J. Welles Wilder Jr.'s Parabolic SAR (stop and reverse), moving average crossovers, or whatever trend indicator you find appropriate. [Figure 1.18](#) shows an example of this type of chart, drawn by hand. Do not underestimate the power of this simple charting exercise.

## CHAPTER 2

# The Market Cycle and the Four Trades

To every thing there is a season, and a time to every purpose under the heaven.

—Ecclesiastes 3:1, KJV

The early twentieth century was a time of great progress in markets and in thinking about markets. There were giants on the earth in those days—legends like Jesse Livermore, old man J. P. Morgan, Bernard Baruch, and Charles Dow. In this fertile environment, Richard Wyckoff developed his understanding of markets and the trading process through conversations and interviews with these master traders. After amassing a sizable personal fortune in the markets, he laid out his system in a set of correspondence courses, as was the practice of the day, to educate the public and to help them avoid the scams and frauds that were so prevalent at the time. Referring to the Wyckoff method is a bit of a misnomer, for he offered no simple system or one way to trade. Rather, Wyckoff created a method for understanding the buying and selling convictions of very large traders and institutions through the patterns their activity left on prices. If the smaller trader could recognize the signs they left in the market, he could align his positions with their activity and interests; in the end, it is the buying and selling pressure of these large pools of money that actually moves the markets. This method is as powerful and as relevant today as it was a hundred years ago.

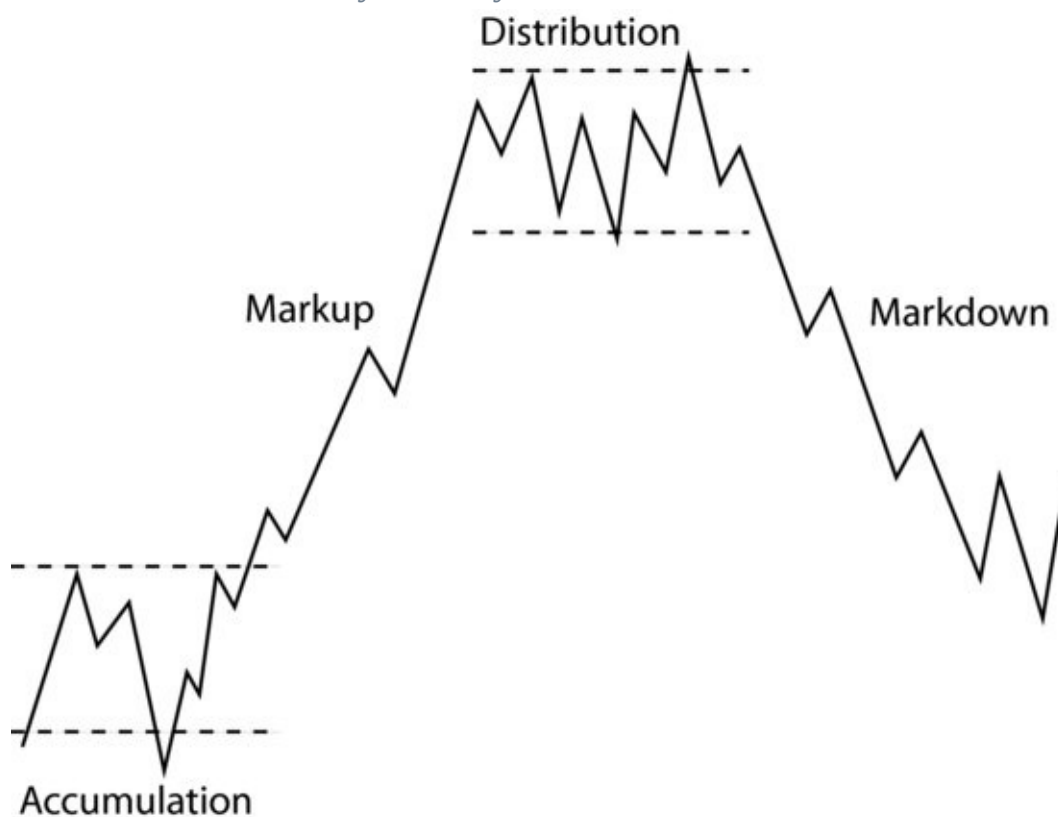
Wyckoff proposed a four-stage market cycle. His idea was that the cycle resulted from the actions of these large players who planned their operations in the market to take advantage of the uneducated public's inappropriate reactions to price movement, but we also see evidence of this cycle in the price patterns of assets such as medieval commodity prices; stocks in early, unsophisticated markets; or trading on very short time frames. It is unlikely that there is the same intervention and manipulation in all of these cases, so the Wyckoff cycle may simply be an expression of the normal ways in which human psychology expresses itself in the marketplace.

## WYCKOFF'S MARKET CYCLE

In this brief introduction, we will consider three aspects of each phase of the cycle. First, we will try to understand the market using a simplified model focusing on the psychological perspective of two major groups: the smart money players who are assumed to be driving the market, and the general, uninformed public. Second, we will consider the crowd psychology of the public, and how individuals are naturally inclined to make mistakes that work in favor of the smart money. Last, we will begin to consider the distinctions and patterns of each part of the cycle from a pure price-pattern perspective; this analysis is important because it motivates and provides context for many trading patterns and methods.

[Figure 2.1](#) presents this cycle in a simple, idealized format. The four phases are:

**FIGURE 2.1** The Classic Wyckoff Cycle



1. *Accumulation*: A sideways range in which large players buy carefully and skillfully, without moving the price. The public is unaware of what is going on; the market is off the radar and out of the public focus while under accumulation.
2. *Markup*: The classic uptrend. At this point, the public becomes aware of



the price movement, and their buying serves to propel prices higher. Smart money players who bought in the accumulation phase may sell some of their holdings into the strength of the uptrend, or they may just hold and wait for higher prices.

3. *Distribution*: Eventually, the uptrend ends and the market enters a distribution phase in which the smart money players sell the remainder of their holdings to the public who are still generally anticipating higher prices. Really smart money players might even sell more than they own and go short in this range.

4. *Markdown*: The downtrend that follows distribution. Smart money players who are short will buy back some of their shorts into this weakness. Eventually, the public realizes that higher prices are not in their future, so they panic and sell their positions. This panic, more often than not, marks the end of the downtrend.

## Accumulation—Building a Base

*Accumulation* is the first stage of the cycle; large operators (funds, banks, other institutions, or even large individual traders) buy without alerting the public to their intentions. This is actually very difficult to do, as buying pressure will naturally support and even raise prices. These players must buy slowly and generally passively over a long period of time to build their positions. From a technical perspective, prices move sideways in a trading range bounded by rough areas of support and resistance, an intermediate-term moving average is flat, and price chops back and forth on both sides of that moving average. As we mentioned earlier, these conditions are indicative of a market in equilibrium, and most technical traders should avoid trading price action like this. However, Wyckoff argues that this is precisely the goal of the longer-term players. They are working very hard to make this look like a market in equilibrium, but it is not. There is a subtle imbalance as smart money is buying and accumulating positions in preparation for the coming uptrend.

There are a few important points to keep in mind about a market in accumulation. First, there is the obvious play of positioning in the accumulation area with the smart money; in most cases this is essentially a higher time frame play. The line between trading and investing can become somewhat blurred if the technical trader plays in these areas, but the key difference is that traders remain alert for signs that the accumulation has failed. If contradictory price

action and market structure emerge, they will exit their positions, while investors will usually wait for lagging fundamentals to signify that something has changed. This leads to the second point, which is that accumulation areas are usually not simple plays in actual practice. It is difficult to time the precise beginning and end of these areas, and the limits of the range are often not cleanly defined. Traders paying breakouts above the range, or stopping out of their positions below the range, will often find themselves executing at exactly the wrong points as they react to price spikes in the noisy range. This is what the market action is designed to do in these areas, so do not play this game.

There are some price patterns and clues we typically see associated with classic accumulation. The most common of these is what Wyckoff called a *spring*, which is called a *failure test* at the bottom of the range in modern terminology. To understand this pattern, think of it from the perspective of the large players accumulating inventory in the range. If these large buyers were to go into the market and buy aggressively, that buying pressure would be a significant portion of the market activity. The market would almost certainly explode higher, which is not what the large players want at this point. It is critical that they measure their buying activity over a long period of time so that they do not lift prices; it is a game of deception. If these large players discover that they can consistently get filled near the bottom of the range (where the market is cheapest), they might buy even more slowly to see if the prices would decline even further. Low prices are *good* for these players, who are trying to accumulate large positions at the lowest possible price. What if they wanted to judge the other market participants' interest in the stock? Perhaps they might stop buying altogether and let the market fall under its own weight.

From this point, there are two different scenarios that they would be watching for. In one, the market drops and keeps dropping, and they see that the rest of the market really has no conviction or interest. Depending on their plan for the campaign, this might or might not affect their decision to continue buying. Perhaps they are very happy to buy the market even lower, or perhaps it is weaker than they expected and they might have to slowly unwind their positions. Large players like these do not take significant losses very often, but they are also not always right. The other possibility is that they stop buying and the market falls, but other buyers immediately step in and arrest the decline. In this case, the large players just got an important piece of information: there is underlying buying interest in the market.

Keep in mind that these types of buyers, and so this type of price action, tend

to be very large and very slow moving. These are usually institutions that may buy many times the stock's average daily trading volume, so most of these plays develop on an almost glacial scale; but, even so, there are critical inflection points that can be defined in minutes or seconds. These drops below the bottom of the accumulation range are examples of specific points in time that require attention and focus.

The presence of other buyers just under the level where the institutions were buying telegraphs real interest. The large player would probably be compelled to immediately resume their buying plan, working very hard to not spook the market. Again, it is a game of deception. If enough players sense the buying pressure, the market will explode into an uptrend, and the large players do not want this until they have accumulated their full line. This type of activity leaves a distinctive and important pattern on a price chart: it will be clear that the market has defined a support area and that price has probed below that support, but that the market spent very little time there because buyers immediately stepped in and pressed the market higher. This is one pattern that candlestick charts can highlight well. Candles with long shadows extending below support but with few or no closes below that support are a sign of accumulation. If we were to look inside the candles on a lower time frame, we would see that most of those excursions below support lasted less than a quarter of the time frame of each candle (i.e., a daily chart spends at most a few hours below support, an hourly chart less than 15 minutes, etc.). [Figure 2.2](#) shows an accumulation area in daily October 2010 Platinum futures. The dotted line is not an exact level, but notice that only candle shadows touch the area—the market is unable to close near the level. Also, the bar marked A is a classic Wyckoff spring, which is a bar that tests below a level and immediately finds buyers. In this case, the price movement off this day led to a multimonth rally.

**FIGURE 2.2** Accumulation in Daily Platinum Futures with a Classic Spring at  
A



This is an important lesson about putting chart patterns in context. A simple statistical test of candles with long lower shadows would find that there is no predictive power to that pattern, but when a market is potentially in accumulation, the presence of these springs can distinctly tilt the probabilities in favor of the upside. Everything we do as traders is a matter of shifting probabilities. We deal in probabilities, not certainties, but the position and context of the higher time frame can often provide warning that a market could be under accumulation, lending more importance to these lower time frame patterns. Notice also that this is a subtle pattern. Though these are not exciting patterns, they are important and contribute to a trader's overall read on the market's action. It is also worth considering that what I am presenting here is an idealized and simplified perspective on a market in accumulation. In actual practice, these patterns are often much more complex and obscured by noise.

From a longer-term perspective, crowd psychology is simple and easy to understand while a market is in accumulation. If the smart money operators are accumulating well and doing their job right, the public simply does not care about the market. The distinguishing psychological feature of a market in accumulation is that it is off the public's radar; no one is thinking about it or talking about it. No journalist writes an article about a market in sideways

consolidation, and no one talks about such markets on television. They are invisible and boring; only smart, professional traders know to watch for these formations. At some point, unobserved and unnoticed, the accumulation breaks to the upside and the stock moves into the next phase of the cycle.

## Markup: The Classic Uptrend

The second part of the cycle is the uptrend (*markup*), and the action of the smart money is not as clearly defined here. Perhaps the institutions may simply hold their full line until the stock is marked up to prices at which they consider it advantageous to sell, or perhaps they will actively buy and sell with the fluctuations of the trend. The public psychology in an uptrend is a subject for study in and of itself. Usually, trends begin out of accumulation and there is little attention from the public. Trends begin in sneaky, unnoticed ways, but, at some point, the price advances far enough that people start to take notice. The classic first reaction is disbelief, followed by a desire to fade (go against) the move. If Wheat futures have been locked in a \$1.00 range for a couple of years, most people are apt to regard a price \$0.50 above that range as too high and will be inclined to short, thinking the aberration will correct itself. This price movement will still not be in focus in the major media, but, when people do talk about it, they will almost universally observe that “fundamentals do not support this move” and there are also many narrative factors that suggest “the risk is too high to consider buying up here.” At the beginning of trends, the prevailing mind-set from the public is usually that the trend is somehow wrong.

As the trend grinds higher, the early, aggressive shorts will be forced to cover, and their buying pressure will, in turn, push the market higher. (Here is a clear example where short sellers are actually a source of significant buying pressure; things are never as simple as they seem, and regulatory pressures to curb short selling are naive and misdirected at best.) The public’s initial disbelief slowly turns into acceptance, and people start buying every dip in an attempt to position themselves with the trend that is now obvious and fully underway. If the trend continues, there may be news stories in the major media featuring the trend, but talking heads will still be divided on the subject. Some will have switched their bearish bias, observing that the market is simply going up, perhaps “climbing the wall of worry” put up by other commentators who still insist the movement cannot be justified by the fundamentals. If you are positioned long in such a trend, this is good—the division of opinion is fuel for the fire. You *want*

dissenting opinions at this point in the market cycle.

We will spend an entire chapter refining our understanding of the characteristic features of price action in trends, but the basic pattern is a series of with-trend legs interspersed with pullbacks, which are also called retracements. Trend traders usually focus a lot of attention on the relationship of each trend leg and pullback to previous legs, in terms of magnitude, length (time), and character (primarily referring to lower time frame price action). Trading plans in trends usually involve either buying into the pullbacks or buying breakouts to new highs as the trend continues higher.

Though there have been many attempts, no one has found a reliable way to judge the large-scale psychology of market participants; however, an understanding of the emotional cycle that drives trend moves is very important. Because market action is, at least to some degree, the sum of many traders' and investors' hopes and fears, many people observe that price action often encourages traders to make mistakes. Markets often present us with the temptation to do the wrong thing at the wrong time, and we will be lured into doing so if we do not understand the psychology of the crowd. Understand this so that you can stand apart from it. The emotional cycle of trends can be summarized as disbelief, acceptance, and, eventually, consensus. When everyone agrees, the trend is usually close to being over.

In some trends, mania sets in and things get a little crazy. Now, *everyone* will be talking about the movement. All the pundits will be in agreement. Even though the market may have appreciated several hundred percent in a year's time, it is now obvious to everyone that there is real demand and the situation is only going to get worse. There will be dire calls of shortages and claims that increased global demand cannot possibly be met by supply. Common sense goes out the window and people do not recognize the significance of the most basic fundamental factors, or, more accurately, they do not understand how fundamental factors change. For instance, in the case of an agricultural commodity, there will be news stories about how the world is running out of the commodity, probably a story here and there about some blight that will destroy the crop on one continent or another, and what are basically calls for the end of the world. For some reason, no one will notice that farmers just planted three times the acreage that was planted in the previous year—the invisible hand is funny like that. Though the manic uptrend seems like an unstoppable force, something very interesting is about to happen: this unstoppable force is about to meet the immovable object in the form of massive supply coming online.

Here is an important lesson for the objective trader: your clue to the fact that psychology has reached the mania stage is when stories begin to show up in the popular, nonfinancial media. At times like that you have one job and one job only—detach yourself from the mass psychology and begin to exit the market. At the very least, you must book partial profits and take steps to reduce the risk on your remaining line.

## Distribution—The End?

Nothing goes on forever. At some point, higher prices will bring increased supply into the market, balance is achieved, and prices will stop rising. From a technical perspective, there are, broadly speaking, two ways this can happen. The manic blow-off end-of-trend pattern just discussed is unusual, but deserves attention because it presents dramatic opportunities and dangers. More common is that the uptrend just runs out of steam, and the market goes into another sideways trading range. The large operators who accumulated positions in the first stage and who held most of their line through the markup now begin quietly selling their inventory to the public (*distribution*). In the accumulation phase, it was important that they hide their buying so as to not cause the market to break into an uptrend too early. Similarly, they must now sell carefully because too much selling pressure could crack the market into a downtrend.

To the untrained eye, distribution areas are indistinguishable from accumulation areas—they are both large, sideways ranges. However, on a more subtle level, we will see that many of the classic signs of accumulation will not be present. When prices drop below support, the market will not rebid quite as quickly. In general, prices may spend more time hugging the bottom of the range; pressure against the top of the range is a bit more common in accumulation. There may even be false breakouts of the top of the range, leaving the candles with long shadows above the highs of the range. This pattern is the opposite of the Wyckoff spring, and is usually called an *upthrust*. Eventually, prices will drop below support at the bottom of the range and will fail to bounce. The market will roll over into the last phase, markdown.

Psychologically, the public is usually still hopeful when a market goes into distribution. They will seize every potential breakout as proof that a new uptrend is just around the corner, and will usually look for any excuse to keep buying. Keep in mind that this pattern occurs in markets that have just had substantial advances, so it is easy to say things like “Look, this thing is up 50 percent year

over year, the fundamentals are great, and the Street obviously loves it.” Every dip is an opportunity to pick up additional shares or contracts, which are now cheaper, so they are basically on sale. Who could pass up such a great opportunity? The public, however, is blind to the subtle differences in patterns that hint that another trend leg up might not be in the cards.

Trading real markets is not quite this simple. For one thing, markets in second-phase uptrends will frequently enter fairly extended sideways ranges in the middle of the trend. Should these be treated as further accumulation areas, in preparation for another markup, or is the trend over and these are distribution areas? There *are* subtle clues in market structure and price action, but it is not always possible to make an accurate judgment in real time. Looking back, or at the middle of a chart, the answer is obvious, but it will not be so obvious at the hard right edge. Even with the best analysis and trading plan, we will simply make the wrong decision sometimes, so any good trading plan will focus on risk management first.

## Markdown: The Bear Market

The last stage is *markdown*, which, in many ways, is the inverse of the markup. Psychologically, if the market has been in a protracted distribution phase, the public will most likely have lost some interest. Some traders will be optimistic, and will plan to “get back in” whenever it moves, but, in general, the public focuses on the same things the major media do: hot markets that are moving. These traders will easily be able to justify buying new highs above the distribution area, as this is how another trend leg would begin. They also will be able to justify buying breakdowns below the distribution area, because the market would be cheaper (on sale?) at those levels. The level of interest will probably be relatively low because the public usually focuses on markets that move, but the general tone will likely be very positive. After all, everyone is now in agreement that the market is going higher, right?

Real downtrends begin out of this environment of optimism or complacency. Eventually, it becomes clear that the declines are a little steeper than expected, and some longs begin to unwind their positions, adding to the selling pressure. The mood of the market changes from optimism to disappointment, and aggressive shorts may even begin to show some teeth as they make larger profits on each successive decline. Bounces fall short of previous highs, and people begin to sell even more aggressively. At some point, everyone becomes



convinced that the company is going out of business or that commodity is “done” or the currency will never rally, and that the correct play is to short it into oblivion. As you might expect by now, such an emotional extreme more often than not marks the very bottom, and the market stabilizes into accumulation in preparation for the next uptrend.

Market structure and price action in a downtrend are not a perfect mirror image of the first stage, but the differences are subtle and difficult to quantify. One of the major pieces of received wisdom from old-school traders is that markets tend to go down much faster than they go up. There is some truth to this, as volatility reliably expands on declines in many markets, and there is also a subjective side to the analysis, as there is a distinctly different feel to rallies in a bear market compared to sell-offs in a bull market. Both structures are pullbacks in established trends, but there is a special kind of franticness and volatility that seems to be a unique attribute of bear markets. Bear market rallies tend to be sharp and vicious, whereas pullbacks in bull markets are usually much more orderly. There is a surprising degree of symmetry—most elements of uptrends and downtrends are mirror images of each other (reflected around the y-axis), but most traders also find that a very different skill set is required to trade each environment. This may explain why some traders avoid bear markets whereas others specialize in them.

## The Cycle in Action

The structure laid out here was originally conceived around the equity markets and on time frames ranging from months to years. It applies especially well there, but it also has relevance to other markets and shorter time frames. Commodity markets tend to follow a similar cycle, but the cycle in commodities is often driven by the production and consumption cycle. Commodities, in general, tend to be a little more cyclical and more prone to seasonal distortions, especially of volatility, than stock indexes are. Currency markets tend to be a little less cyclical and tend to trend better than most other asset classes over longer time frames. That said, there certainly are times when this cycle does apply to the currency markets—for instance, in extreme situations accompanied by emotional elation or stress.

The concept of fractal markets, as Mandelbrot and Hudson (2006) have written about, is especially important when considering the Wyckoff cycle. Simply put, this means that the same patterns appear in very long-term markets as in very short-term markets. However, much of the academic work supporting this concept does not recognize that patterns may not be *tradable* on all time frames. It is not always possible to trade 5-minute charts the same way as weekly charts, even though the patterns may superficially appear to be similar. In addition, not enough work has been done on the relationship of fractal markets and liquidity. In the shorter time frames, patterns are bounded by liquidity. For instance, very active stocks might show fractal patterns down to the 15-second time frame, while less liquid commodities or stocks might degenerate into noise anywhere below the daily level.

So, it should be easy to make money trading this cycle, right? Find accumulation on your chosen time frame. Buy. Wait for distribution. Sell and sell short. Cover shorts when the market goes back into accumulation. Repeat. Simple, right? Not so fast. Though this cycle provides a useful road map and large-scale framework, there are many nontrivial problems in actual application:

- Accumulation does lead to significant advances, but it is difficult to time entries out of accumulation areas. Buying breakouts results in a string of small (or, depending on your trade management discipline, not so small) losses that do add up.
- Buying within the accumulation area is not simple, as there are usually no clear risk points. Setting stops under accumulation areas is usually wrong,

because you want to be buying those flushes, not selling into them.

- Sometimes what looks like accumulation turns out to not be accumulation, the bottom drops, and the market does not look back. Small losses can quickly become big problems in this environment.
- Trading bull and bear trends (markup and markdown) is also not as simple as might be expected. There are many tradable patterns in trends, as well as patterns that suggest the trend is coming to an end, but it takes real skill to identify and to trade these patterns.
- Markup periods often go into long, sideways ranges that may be either accumulation or distribution. The pattern is not always accumulation → uptrend → distribution; it is sometimes accumulation → uptrend → accumulation, or some other variation.

And perhaps most importantly, remember that no trader is correct 100 percent of the time, and being wrong means being on the wrong side of the market. Risk management is essential to limit the damage on the times you are wrong.

## THE FOUR TRADES

Wyckoff's market cycle is a highly idealized view of market action, but it does lay the foundation for a simple categorization of technical trades into four categories. There are two trend trades: *trend continuation* and *trend termination*, and two support and resistance trades: *holding* and *failing*. Though this may seem like an arbitrary classification system, it is not. Every technical trade imaginable falls into one of these categories. Trades from certain categories are more appropriate at certain points in the market structure, so it is worthwhile to carefully consider your trades in this context.

The first question to consider is: Are all of your trade setups in one category? If so, this may not be a bad thing—a successful trading methodology must fit the trader's personality—but most traders will have the best results when they have at least two counterbalancing setups. For instance, a trader who focuses on breakout trades should probably understand the patterns of failed breakouts. A trader who trades pullbacks in trends should probably also be able to trade the patterns that occur at the ends of trends. There are two reasons behind this suggestion. First, you should become intimately familiar with the patterns associated with the failure of the patterns you trade. The second reason is related to self-control and psychology—there is an old saying: “If the only tool you have is a hammer, every problem you encounter will look like a nail.” If you are only a skilled breakout trader, you may find it difficult to wait for the excellent breakout trades, and may try to force suboptimal patterns into this mold. If you have the freedom and the skills to switch to the setups that match the market conditions, you will be able to adapt your trading skills to the market environment. There is certainly room for the specialist who does one trade and does it very well, but many traders find success with a broader approach.

Some market environments favor certain kinds of plays over others. If you are a trader who trades all categories, are you applying the right kind of plays to the right market environments? For instance, do you find yourself having many losing trades trying to short against resistance levels in uptrends because you feel they have gone too far? If so, your results might improve if you apply with-trend trades to those situations and more carefully define the market environments that will reward your *fading* (going against the trend) of strength into resistance. Those environments exist—you just aren't finding them with your plays. If you are a specialist who focuses on only one setup or pattern (and, to be clear, this is

not a criticism if you are successful this way), then you need to realize that only a few specific market environments favor your play and wait for those environments. You can redefine your job description to include *not trading*. Wait on the sidelines, and wait for the environments in which you can excel. Again, those environments exist, but you probably are burning through a lot of mental and financial capital trying to find them. Clarify your setups. Categorize them, and then simplify, simplify, simplify.

Let's look briefly at each of the four broad categories and ask the following questions from a general, high-level perspective:

- Which trade setups fall into this category?
- What are the associated probabilities, reward/risk profiles, and overall expectancies of these trades?
- How do these trades fail?

## Trend Continuation

Trend continuation plays are not simply trend plays or with-trend plays. The name implies that we find a market with a trend, whether a nascent trend or an already well-established trend, and then we seek to put on plays in the direction of that trend. Perhaps the most common trend continuation play is to use the pullbacks in a trend to position for further trend legs. It is also possible to structure breakout trades that would be with-trend plays, and there is at least one other category of trend continuation plays—trying to get involved in the very early structure of a new trend. In the context of our simplified stage model, trend continuation trades are most appropriate in markup or markdown, but these early trend trades may be attempted where accumulation breaks into the uptrend or where distribution breaks down into the new downtrend. If you are trading in these areas of uncertainty, it is important to not be stubborn. An aborted breakout of accumulation into an uptrend may well be an upthrust, which is a sign of potential *distribution*. Listen to the message of the market and adjust accordingly.

Trend continuation plays tend to be high-probability plays because there is a verifiable, statistical edge for trend continuation; these plays are aligned with one of the fundamental principles of price behavior. It is important to have both the risk and the expectation of the trade defined before entry; this is an absolute requirement of any specific trade setup, but it can be difficult with trend continuation trades. The key to defining risk is to define the points at which the trend trade is conclusively wrong, at which the trend is violated. Sometimes it is not possible to define nonarbitrary points at which the trend will be violated that are close enough to the entry point to still offer attractive reward/risk characteristics. On the upside, the best examples of these trades break into multileg trends that continue much further than anyone expected, but the most reliable profits are taken consistently at or just beyond the previous highs.

There are several common failure patterns associated with these types of trades. First, there may simply not be enough with-trend pressure to push the market into another trend leg, so previous resistance holds (in the case of an uptrend) and the market rolls over into a trading range (or distribution). Traders trading simple pullbacks need to be aware that many pullbacks in strong trends are complex, two-legged consolidations (see Chapter 3), so a good trading plan will plan for that possibility. Dramatic failures of these trades are somewhat

uncommon, but they do happen. Most failed trend continuation trades tend to be rather polite affairs, usually giving the trader a chance to get out for a small loss. However, there is always danger when everyone is leaning the same way in a market, and, especially in well-established trends, there are places where many market participants have piled into a very obvious trend continuation play. In these situations, especially in extremely overextended markets, reversals can be dramatic as everyone scrambles for the exit at the same time.

## Trend Termination

More than any other category, precise terminology is important here. If we were less careful, we might apply a label like “trend reversal” to most of the trades in this category, but this is counterproductive because it fails to precisely define the trader’s expectations. If you think you are trading trend reversal trades, then you expect that a winning trade should roll over into a trend in the opposite direction. This is a true trend reversal, and these spots offer exceptional reward/risk profiles and near-perfect trade location. How many traders would like to sell the high tick or buy the very low at a reversal? However, true trend reversals are rare, and it is much more common to sell somewhere near the high and to then see the market stop trending. Be clear on this: This is a *win* for a trend termination trade—the trend stopped. Anything else is a bonus, so it is important to adjust your expectations accordingly.

The obvious spots in the cycle for trend termination trades are where the uptrend stops and moves into distribution, and vice versa on the downside, but there are other possibilities. Some traders specialize in finding overextended spots in established trends, and *fading* (going against the trend) these for a very quick and short reversal. For instance, a trader might find spots where the rallies in the uptrend have run up too far too fast, and take short positions against those rallies, planning to cover one to three bars later. These are trades for only the fastest and most nimble traders; developing traders are well advised to avoid these countertrend scalps because they remove focus from the big picture. Staying in a consistent time frame is important for these definitions; a trader might look for spots where the short-term downtrends (pullbacks) in the uptrend have overextended themselves, and then take long positions against those lower time frame downtrends. In this case, the trader is actually positioning countertrend on the lower time frame but with the trend on the trading time frame. Is this a trend continuation or trend termination trade? The answer depends on your perspective and your time frame, and it is only important to be consistent. Understand what you are trying to accomplish with the trade and how this best fits in the evolving market structure.

Trend termination plays are not usually high-probability plays, but the compensation is that winning trades tend to offer potential rewards much larger than the initial risk. If your patterns allow you to position short near the absolute high point of a trend leg with some degree of confidence, then you have a well-



defined risk point and the potential for outsized profits on some subset of these trades. Over a large enough sample size, the risk/reward profile may be very good, leading to a solid positive expectancy even if most of these trades are losers.

Trend termination trades are countertrend (counter to the existing trend) trades, and trade management is an important issue. Most really dramatic trading losses, the kind that blow traders out of the water (and that don't involve options) come from traders fading trends and adding to those positions as the trend continues to move against them. If this is one of the situations where the trend turns into a manic, parabolic blow-off, there is a real possibility for a career-ending loss on a single trade. For swing traders, there will sometimes be dramatic gaps against positions held countertrend overnight, so this needs to be considered in the risk management and position sizing scheme. More than any other category of trade, iron discipline is required to trade these with any degree of consistency.

## Support or Resistance Holding

There is some overlap between these categories, and it is possible to apply trades from these categories in more than one spot in the market structure. We might expect that most support/resistance trades will take place in accumulation or distribution areas while the market chops sideways, but a trader trading with-trend trades could initiate those trades by buying support in the trend. Are these trend continuation trades or support holding trades? The answer is both, so traders must build a well-thought-out classification system that reflects their approach to the market. Your trading patterns and rules are the tools through which you structure price action and market structure, and they must make sense *to you*. Take the time to define them clearly.

It is easy to find examples of well-defined trading ranges on historical charts where you could buy and risk a very small amount as the market bounces off the magic price at the bottom of the range. These trades do exist, but they are a small subset of support holding trades. Support, even when it holds, usually does not hold cleanly. The dropouts below support actually contribute to the strength of that support, as buyers are shaken out of their positions and are forced to reposition when it becomes obvious that the drop was a fake-out. For the shorter-term trader trading these patterns, there are some important issues to consider. If you know that support levels are not clean, how will you trade around them? Will you sell your position when the level drops, book many small losses, and reestablish when it holds again? Will you simply position small in the range, plan to buy more if it drops, and accept that you will occasionally take very large losses on your maximum size when the market does drop? If you are scaling in, how will you deal with the fact that your easy wins will not be on your full size, as you did not have the opportunity to buy your full line near the bottom of the range? By the time you see the support level is holding, the market will already be far from the level, increasing the size of the stop loss needed.

Because of these issues, support/resistance holding trades, as a group, tend to have the lowest reward/risk ratios. By definition, *at* support, there is an imbalance of buying pressure that creates the support, but the market is usually in relative equilibrium just above that support. Most traders will try to avoid trading in these equilibrium areas, so many support holding trades set up in suboptimal trading environments. It is worth mentioning that there is a special subset of support/resistance holding trades that actually are very high-probability

trades: failed breakouts. Remember, when everyone is leaning the wrong way, the potential for dramatic moves increases greatly, and nowhere is that more true than in a failed breakout.

## Support or Resistance Breaking or Failing

Support/resistance breaking trades are the classic breakout or breakout from channel trades and, ideally, would be located at the end of accumulation or distribution phases. In fact, these trades actually define the end of accumulation or distribution, as the support or resistance fails and the market breaks into a trend phase. Another place for support/resistance breaking trades is in trends, but many of these are lower time frame breakout entries into the trading time frame trending pattern. Many traders, especially daytraders, find themselves drawn to these patterns because of the many examples where they work dramatically well. Many trading books show example after example of dramatic breakouts, but there is one small problem with breakout trades—most breakouts fail.

In addition, the actual breakout areas tend to be high-volatility and low-liquidity areas, which can increase the risk in these trades. They occur at very visible chart points, and so they are often very crowded trades. The presence of unusual volume and volatility can create opportunities, but it also creates dangers. Execution skills probably matter more here than in any other category of trade, as slippage and thin markets can significantly erode a trader's edge. These trades can offer outstanding reward/risk profiles, but, especially in short-term trades, it is important to remember that realized losses can sometimes be many multiples of the intended risk, significantly complicating the position sizing problem. This is not a fatal flaw, but it must be considered in your risk management scheme.

Depending on the time frame and intended holding period for the trade, it may be possible to find that there are patterns that precede and set up the best examples of these trades. The best resistance breaking trades will be driven by large-scale buying imbalances, and these imbalances usually show, for instance, as the market holds higher lows into the resistance level before the actual breakout. Breakouts driven by small traders who are simply trying to scalp small profits in the increased volatility are less reliable and are usually not set up by these larger-scale patterns. In the very best examples of these trades, buyers who are trapped out of the market by the suddenness of the breakout will be compelled to buy into the market over coming days or weeks, and this buying

pressure will provide favorable tailwinds for the trade. Traders specializing in breakout trades usually spend a lot of time studying the patterns that set up the best trades, and maintain a watch list of potential candidates for trades at any time. Executing unplanned breakout trades in a reactive mode is unlikely to be a formula for long-term success.

## SUMMARY

These four categories of trades provide an excellent framework for thinking about technical trades. This is a simple, valid, and consistent labeling scheme, and it is nearly impossible to find a technical trade that does not fit within these categories. Many trades may fit into more than one, especially when the complexities of multiple time frames are considered, but this does not compromise the utility of the system. This is not intended to be a rigid, artificial classification system, but rather a dynamic framework that can grow and evolve with your trading style and your understanding of market behavior.

Not to wax too philosophical, but there is another way to think about this cycle. Some branches of Eastern philosophy believe that every manifest thing we see, feel, or experience in any way comes from the interaction of two opposing, primordial forces. These philosophies tell us that one force can never fully overcome the other, and, when one seems to predominate, it contains within itself the seed of the other. In the market, buying and selling pressure are these twin opposing forces. When buying pressure seems to be strongest, the end of the uptrend trend is often near. When the sellers seem to be decisively winning the battle, the stage is set for a reversal into an uptrend. This is why it is so important for traders to learn to stand apart from the crowd, and the only way to do this is to understand the actions and the emotions of that market crowd.

# PART II

## Market Structure

# PART III

## Trading Strategies

# PART IV

## The Individual, Self-Directed Trader



## CHAPTER 11

# The Trader's Mind

If you open yourself to insight, you are at one with insight and you can use it completely.

If you open yourself to loss, you are at one with loss and you can accept it completely.

—Daodejing (ca. 6 BCE)

At one point or another, everyone who has interactions with the market asks oneself, “Why is trading so hard?” There are legitimate reasons why trading *should* be difficult: markets are highly random; whatever edge we can find is eroded by competition from smart, well-capitalized traders; some traders work within various constraints; and markets are subject to very large shocks that can have devastating effects on unprepared traders. Even so, it seems like something else is going on, almost like we are our own worst enemies at times. What is it about markets that encourages people to do exactly the wrong thing at the wrong time, and why do many of the behaviors that serve us so well in other situations actually work against us in the market?

Part of the answer lies in the nature of the market itself. What we call “the market” is actually the end result of the interactions of thousands of traders across the gamut of size, holding period, and intent. Each trader is constantly trying to gain an advantage over the others; market behavior is the sum of all of this activity, reflecting both the rational analysis and the psychological reactions of all participants. This creates an environment that has basically evolved to encourage individual traders to make mistakes. That is an important point—*the market is essentially designed to cause traders to do the wrong thing at the wrong time*. The market turns our cognitive tools and psychological quirks against us, making us our own enemy in the marketplace. It is not so much that the market is against us; it is that the market sets us against ourselves.

These issues are particularly relevant to the individual, self-directed trader who has few limits placed on his or her behavior and is faced with the nebulous job description of “making money.” Traders in institutional settings have many advantages over the individual, not the least of which is that the institutional

framework places many restrictions on their actions. These constraints, along with guidance from management and implicit mentoring from senior traders, provide a strong framework for shaping behavior and make new traders in these settings less vulnerable to some of the common psychological stresses and errors. Furthermore, many institutional traders have specific, clearly defined roles such as executing and managing complex sets of hedges, or managing inventory and flow resulting from customer orders. These traders are not faced with the broad task of beating the market and can become quite skilled at their jobs without fully conquering all of the psychological challenges of trading.

One word of warning: Though we now turn our focus to psychological elements of trading, positive thinking, meditation, visualization, and correct psychology can take you only so far. You absolutely *must* have an edge in the market to make money. For most styles of trading, it is impossible to apply that edge well without the proper psychological skills, but those psychological tools are not, by themselves, an actual trading edge. This chapter begins with a look at how the market turns some of our reasoning ability against us and how we become our own worst enemies in the market. Next, we look at intuition and flow, which are essential components of top-level trading for many traders. In particular, the flow experience is an important part of both performance and skill development. The chapter ends with some concrete suggestions for developing an environment that allows the developing trader to work to overcome some of the more common psychological errors.

# PSYCHOLOGICAL CHALLENGES OF THE MARKETPLACE

The psychological demands of trading are almost unique in the human experience. First, there are serious consequences for making errors; trading decisions are high-risk decisions. Even if losses are limited so that no one trade can hurt us badly, it is a rare trader who can face 10 losses in a row without significant pain and suffering—even traders with secure institutional jobs may be in trouble after a string of losses. Furthermore, losses do not always result from bad decisions, and, even more ominously, bad decisions sometimes lead to good outcomes. This is a reflection of the randomness in the market environment, but it is very difficult to hone skills and to develop intuition when results cannot always be clearly tied to actions.

Furthermore, every trading decision you will ever make is *always* made with insufficient information. We never know everything there is to know about any trade, and, no matter how good our research is, there are many things that are simply unknowable. Even if you somehow could accumulate every relevant piece of information, known and unknown, there is always the possibility that a large order could be dumped into the market with unpredictable results—anything can happen in the market. In addition, many trading decisions must be made quickly and under pressure. There are certainly types of trading for which this is less true, but the actual decision to do *something* always comes down to one point in time. Someone has to pull the trigger, and risk management decisions sometimes have to be made on the fly in response to developing market action. This is the trading environment—high-risk decisions, made under pressure with insufficient information. Seen in this light, the reasons for some of the psychological challenges become clearer.

## EVOLUTIONARY ADAPTATIONS

Many of the cognitive tools we possess may be relics from earlier times in our development as a species; though they might have been helpful in prehistory, they often fail us completely in modern life. For instance, the adrenaline flood associated with the fight-or-flight response might have been useful in fleeing from a saber-toothed tiger. It is easy to see how natural selection might have strengthened this response: If there were early humans who didn't have it, they became lunch. In modern life, this same response leads to road rage, bar fights, constant stress, and a whole list of endocrine-related diseases. This is who we are as a species. It is not possible to be completely free from these quirks, because they are part of the very fabric of our being; we are, and always will be, vulnerable to making certain kinds of mistakes in certain situations. The best we can do is to be aware of these biases and errors and to attempt to counteract them; but be clear on this point—you cannot *fix* them.

## Perceiving Patterns in Randomness

Have you ever seen faces in clouds, or shapes in the wood grain of finished furniture? Ever heard voices murmuring, just out of the range of perception, when you hold a seashell up to your ear? These are universal experiences, and they most likely come from a slight misfiring of some powerful cognitive machinery. For instance, processing and recognizing faces is actually an extremely complex task, but nearly all humans can do this naturally and instantaneously. There are specific areas of the brain that have evolved to deal with this complex task, but the same areas of the brain will also take random patterns in clouds and force them into the structure of human faces. From an evolutionary perspective, there was no payoff for being able to properly process random data, no reason that natural selection would have preserved this skill. Instead, humans who could quickly process faces and manage social interactions with their peers were probably far more likely to survive in prehistory than were early humans who did not excel at these skills.

We are pattern recognition machines. Our brains are so good at recognizing patterns that they will readily create patterns where none exist. We attempt to make order out of chaos by imposing structured patterns on randomness. Traders often do not fully appreciate this fact—they do not understand that much of what they see in the market, no matter how convincing the pattern looks and feels, could simply be due to random fluctuations in the market. It is impossible to overestimate the seriousness of this bias.

## Heuristics

A heuristic is a rule of thumb, a cognitive shortcut that can quickly find the answer to a problem that might otherwise be intractable. They are extremely fast and efficient; there are some problems that can be solved in seconds or minutes heuristically that would require hours or days of rational analysis. The root of heuristic thinking is the ability to relate new experiences to old, already processed information—“Oh, this looks like that.” We learn, think, and deal with the outside world by generalizing and filing our experiences into broad categories, and when new situations are encountered we relate them back to these broad categories. In the market, we are likely to relate situations and patterns to groups of patterns that we have previously created or noticed, whether or not there is a valid link between the two sets.

Heuristics are useful or even essential for traders, but it is important that they are built from valid information and are carefully trained. Left unchecked, incorrect heuristics can be created and reinforced in the highly random market environment. For instance, one trader might have a heuristic that leads him to pay breakouts of the previous day’s high in stock index futures, because he can remember many examples of good winning trades. Another trader, who has actually done the research, might have the correct heuristic, which in this case, would be to fade those highs. Both traders can make a trading decision quickly, but the trader whose intuition is based on correct principles of market behavior will make the *right* decision.

## Shifting Blame

If you spend any time at all around traders, you will hear language like this: “Oh, *they* got my stop again.” “That guy screwed me again. Can you believe that?” “Oh, *they* always do that. That’s criminal! How can *they* always do this to me?” Traders tend to blame their losses on some great, nefarious, unseen *them* that is manipulating the markets behind the scenes—the U.S. government buying stock futures (the “Plunge Protection Team”), the floor traders manipulating markets, high-frequency trading (HFT) algorithms stealing from traders, or big banks heedlessly pushing markets around. Some or all of these things may happen, but here is the point: it doesn’t matter. You would perceive this intentionality in the market whether it exists or not. You would feel a great unseen *them*, because of the way your brain is wired. *They* may or may not be real, but your perception of a third party manipulating the market says much more about your own cognition than about the market itself.

Markets are blatantly manipulated at times, of this there is no doubt. However, market action is the end result of the competing activity of tens of thousands of traders, across many time frames, with different objectives and perspectives; everything is folded into the patterns of market behavior and much of it nets out to noise. Rather than being angry when a market ticks your stop, either accept it as a natural event or, if your stop was placed incorrectly, modify your behavior. If this type of unwanted outcome happens frequently enough that you are this unhappy with it, you are probably doing something that is against the nature of the market. It is a simple choice: continue to deflect and to be angry at the way the market moves, or align yourself with it.

## Fight or Flight

The fight-or-flight response is an amazing physiological adaptation. In times of great stress or danger, hormones flood our bloodstream, and our bodies and minds are transformed. Our breathing and heart rate speed up, and blood vessels contract in our extremities so that oxygen is routed to essential areas. This is the response that lets little old ladies lift cars off children or allows soldiers to continue in battle oblivious to grievous wounds. All of this is well known, but what a lot of people do not realize is that the way we perceive outside information also undergoes a profound shift under the fight-or-flight response—our hearing is impaired and our vision actually narrows. Tunnel vision is not just a figure of speech—it is a perceptual reality in response to stress.

In times of physical danger, this response can be a lifesaver, but the problem in modern society is that we have these same fight-or-flight responses to nonphysical stresses. There is only a flood of hormones, but it is not followed by fighting or running. Our bodies transform to prepare for action, but then we sit at our desk and *maybe* squeeze a stress ball if we're really worked up. Nothing in the history of our evolution has prepared us for this situation, and the hormonal flood becomes a constant stress on our systems. Traders experience dramatic emotional swings and the stress of this fight-or-flight response constantly, sometimes several times in a single hour, all through the trading day. The effects of this response on our minds are fairly well known, but the cumulative impact on our bodies is much less well understood. Traders must master their emotions well enough to minimize their exposure to this hormonal barrage that can impair perception, wear on the body, and cause great damage to trading accounts.

## Aggression: The Good, the Bad, and the Ugly

Most people believe that aggressiveness is a desirable quality for traders, and many outsiders have the impression that trading desks are populated exclusively by Red Bull–pounding, hyperaggressive 20-somethings. There is a grain of truth to this; these types are often attracted to the challenge and perceived glamour of being a trader, but there may be a difference between the kind of people who are initially attracted to the profession and those who survive. Aggression is a legitimate trading skill, but it must be disciplined and controlled.

If you find yourself in a situation where you are on tilt or otherwise out of control, the first step in fixing the problem is recognizing that you are there. This



requires a degree of self-awareness than few new traders possess; it is the nature of this state of mind that it blinds you to everything except your anger and aggression toward the market. If you find yourself in this state, on the edge of losing control, realize that you are now in a very elite group of self-directed traders, the vast majority of whom will never achieve the clarity needed to evaluate their mental state. The first thing you need to do is to stop whatever you are doing; you cannot make good decisions when you are on tilt. Your brain is in a chemically compromised state—you are not in your right mind, and that is not a figure of speech. It is not just that you are making bad decisions; the situation is actually much worse—you *are incapable* of making good decisions in this state because the chemical balance of your body has been altered. As you mature as a trader, you will find yourself here less often, but it is good to have some concrete ideas and actions you can take when you find yourself on tilt:

- Stop trading.
- If you are a short-term trader, immediately exit any position that is showing a loss, and place breakeven or better stops on any other open trades. Even if you are a trader who does not normally place stops in the market, you do now. This is a special situation, and the objective is to remove yourself from the decision process for a period of time.
- Stand up and move around. Take a break, and go for a walk outside. If it is cold, maybe go for a walk without a coat. You don't want to be comfortable; you want to be jarred out of your mental state.
- Exercise. Go to the gym or do something physical.
- Have a non-trading-related conversation with another person. Trading is an isolating experience, even if you are surrounded by other traders. Sometimes we get so stuck inside our heads that a normal two-minute conversation can do wonders. Talk to the clerk at Starbucks. Call your mom. Do whatever it takes to break the cycle.
- Write something with pencil and paper. At least for me, there is some kind of magic in pencil and paper; it is not the same to type on a keyboard. As for what to write, it might be a good idea to write in your trading journal, but even a grocery list will work. Just write.
- Breathe deeply. If you can slow your body down and get control of your physiology, the mind will follow. Meditation can be another powerful tool.
- When you have cooled down and are ready to trade, do one insignificant trade of a very small size. Monitor your psychological reactions to that one trade. If you aren't ready to go back in the game, you will know.

- If you fail the previous test and are still rattled, take a longer break. There may be some cases where you need to take a break lasting weeks or months. If so, do not think about the lost opportunity; focus on the damage you will not do by trading when you are compromised.

These are guidelines, but they have been useful for me and for many of the traders I have worked with over the years. You will find your own list over time, but breaking the destructive cycle before it has a serious effect on your trading account is the key.

# COGNITIVE BIASES

This chapter opened with the question “Why is trading so hard?” It seems that it should be easier than it actually is: we acknowledge that markets are extremely random and that there is a very small component of actionable trading signals in market data, but it is there. Why is it not possible to devise simple ways to capture this edge and watch profits accumulate in the trading account? This actually does describe the best high-level trading, but few individual traders ever get to that stage. One of the reasons is that the evolutionary adaptations and heuristics we just discussed result in some consistent cognitive biases. We are practically designed to make trading mistakes. Though these skills do serve useful purposes, unchecked they work just as effectively to ensure our failure as traders. Most traders enter the marketplace with no awareness of the handicaps and weaknesses they bring into the arena, and they are doomed to failure before they even begin. The first step in combating these biases is knowing that they exist and that they will unavoidably color every interaction with the market. A partial list of some of the more common cognitive biases follows.

## Gambler’s Fallacy

The gambler’s fallacy stems from faulty intuition about random processes. After observing deviations in a random process, most people will be inclined to think that future deviations in the *opposite* direction are more likely. For instance, someone betting that a coin would flip heads might be inclined to increase the bet size after a few consecutive tails, or a trader might increase risk on trades after a string of losers. In both cases, they would feel that a win was somehow overdue. At the risk of oversimplifying, most of the problem comes from the fact that runs or streaks are much more common in random data than most people would expect; this single fact is responsible for many of the faulty intuitions we have about randomness.

It is also worth considering that there are cases in which the gambler’s fallacy must be modified in market situations. The market is not always a flip of a fair coin. Markets exist in different regimes (e.g., trends or trading ranges, high-or low-volatility conditions, etc.) and certain kinds of trades will have strings of wins or losses in those conditions. It is important to understand the math and the theory, but it is equally important to understand where reality might deviate from

those theoretical principles.

## Biases Concerning Losses

Consider the following two scenarios. In each, you have a choice between taking the certain payout or loss and playing the game of chance:

1. You are given the choice between a certain \$100 win and a 20 percent chance of making \$1,000 with an 80 percent chance of winning nothing.
2. You are given the choice between a certain \$100 loss and a 20 percent chance of losing (having to pay) \$1,000 with an 80 percent chance of losing nothing.

In these cases, it is easy to evaluate the expected values, which tell us which are the correct choices to make probabilistically. In the first game, the winning game, the chance scenario has an expected value of \$200 ( $0.2 \times \$1,000$ ), which is twice the certain payout. There is no doubt that the correct course of action is to play the game of chance, rather than taking the certain \$100. The same math applies for the losing scenario: a certain loss of \$100 compared to an expected value of a \$200 loss for the game of chance.

Logically, the correct course of action is clear: play the game of chance in the winning scenario instead of taking the certain gain, and take the certain loss in the second scenario. Most people, and even most traders, are inclined to do exactly the opposite in both cases. They will want to lock in the certain gain and will prefer to take their chances on the loss because there is *some* chance that they can avoid the loss altogether. This results in suboptimal decisions with respect to position management and exiting both winners and losers. Many traders will take small wins and will hold on to a loss in the hope that it will come back and they can somehow at least break even. There is good justification for the old adage to “cut your losers and let your winners run,” but many traders find this difficult to do in practice.

Another related problem, especially for newer traders, is that many traders find it difficult to calibrate their perception of risk inherent in a stop. Nearly all traders would prefer a small stop on a trade to a wide stop, with the idea that it is better to take a small loss than a big one. If you are properly and consistently sizing positions, there really is no such thing as a low-risk trade; every trade will have a consistent impact on the bottom line regardless of the distance to the stop point, but there certainly are *low-probability* trades. A tight stop may have such a high probability of being hit that it is, for all intents and purposes, a nearly certain loss. Over a large sample size, this is actually a very high-risk stop, even

though it might be a loss of only a few pennies at a time.

## Overconfidence Bias

Psychological research shows, time and again, that people tend to have an inflated view of their abilities and skills. Most people believe they are better, smarter, and more skilled than average. (Of course, it is impossible for *most* people to be better than the average!) This problem is exacerbated because trading tends to attract competitive, confident people to begin with. Thinking that we are better than we are is a recipe for disaster and is probably one of the reasons why so few traders make it past the learning curve.

There are traders whose hubris extends to every aspect of trading, but the market usually eliminates those traders quickly and efficiently. It is far more common to find traders who believe they have a special skill or affinity for an asset class. Do you just *know* what a certain set of stocks is going to do? Do you have a *special sense* for the relationship between a currency and a commodity? Do you have a *touch* for a certain trade setup? Well, one of the great things about trading is that it is easy to evaluate performance: are you making money? If you have a special skill, the only way it matters is if you are making consistent money over a large sample of trades. There are no excuses. In many cases, traders are much more confident about their trading abilities, about their analytical abilities, and about the epistemological limits of market knowledge than can possibly be justified by their results. We are never as good as we think we are, and markets are far more random and far less knowable than we wished they were.

## Confirmation Bias

Confirmation bias is the tendency to overweight information that reinforces our beliefs and to ignore or downplay information that contradicts. This bias is a key part of keeping many other biases alive. For instance, traders could not be overconfident in their ability with a certain trade setup if they were truly, objectively evaluating their results. However, when they remember two winners and forget about five losers, or come up with reasons why the five losers shouldn't matter, they are engaging in confirmation bias. Record keeping, both of trade results and of research, is critical, because this bias often distorts memory—you simply will not remember contradictory information, or it will be somehow fuzzy and obscured. In most cases, the confirmation bias is not a deliberate attempt to deceive or to manipulate data, but it occurs as a result of the fundamental ways in which we process information.



## Anchoring Bias

Anchoring bias is the tendency to place undue weight on one particular piece of information and to ignore everything else. In the case of the overconfident trader, maybe she has made a trade 20 times with 18 losers, but one of the winners was dramatic. It is easy to find your entire perspective colored by a large outlier event, whether it was good or bad. Careful, objective analysis of trade results and pattern studies will guard against this bias. Paradoxically, though it is important for traders to spend time studying the market and its patterns, studying carefully chosen trade examples can actually be counterproductive; too many traders waste time trying to figure out how to reproduce the 1-in-10,000 trade. Do not spend undue time analyzing your big winners or losers; rather, spend time studying the entire set, and understand how those large outcomes fit within the framework of all possible trades.

## Recency Bias

Recency bias is the tendency to overweight recent information, or information near the end of a series. Good public speakers know this and structure their speeches around this effect—always end with whatever you want the audience to remember. Good teachers know this when they review key information at the end of a lesson. Traders do not always realize how much they may be swayed by the most recent results of their trading system. There is a potentially nasty interplay between this bias and the tendency of the market to spend time in certain regimes or phases. Imagine a trader trading a good system that just happens to have a large loss due to a market distortion such as a large gap opening. On the next trade, the trader is probably going to be focusing on this loss rather than on the long history of the system. Once again, careful record keeping and broad studies of patterns are important; learn to see each event, regardless of where it falls in the time line, as only one of many possible outcomes, and avoid attaching too much significance to large events, good or bad, near the end of the series.

## Hindsight Bias

“Coulda, woulda, shoulda”—these are the poster children for this bias. When you are evaluating a trade and think you should have seen something or you could have avoided a loss if you had realized a piece of information was significant, be careful. It is far easier to say this after the fact than it is to act on this kind of information in the middle of the trade. This is another reason to avoid putting too much emphasis on the outcome of any one trade. If you spend too much time reviewing large winners or losers, there is a temptation to try to see what you could have done differently as the trade developed.

## Illusion of Control

Research has shown that, particularly in stressful and competitive environments, people are unable to distinguish between outcomes due to skill or chance. Langer (1975), who first coined the term *illusion of control*, showed that it was more prevalent in tasks when “skill cues” were present—competitive tasks with clearly defined and familiar outcomes where the individual seems to have the ability to make a choice. In an experimental setting, if you have someone sit and watch a box with randomly flashing numbers and tell them they win when the numbers increase, they are not likely to think their skill has any effect on their results. However, give them a button to push, even if the button does nothing, and their assessment of their skill and its relevance to the task goes through the roof. Casinos know this when they design games of chance; why else would thousands of people push a button or pull a lever attached to a random outcome, and one with a negative expectancy, for hours at a time? For traders, this can be fatal. Many of the other biases are wrapped into one powerful package here—overconfidence, attribution, hindsight, confirmation—and these all reinforce the illusion that traders are really better than they are, and suppress the role that randomness plays in the bottom line.

For traders brave enough to try it, Mauboussin (2010) proposes an interesting solution: can you lose deliberately? At first, you will think the answer is obviously yes, but think deeper. Are you really confident that you could, for an extended period of time, trade *against* your methodology trying to lose, and show results that would be significantly different than what you have achieved trying to win? If you cannot lose deliberately, then whatever wins or losses you are experiencing are merely the result of chance. In short, you are wasting your time. It is better to know you do not know—to know you do not have an edge—than to waste your time and money on a futile exercise.

# THE RANDOM REINFORCEMENT PROBLEM

In the rational, sane world, correct actions are met with rewards, and doing the wrong thing results in punishment. This is simple cause and effect, but unfortunately, this is not the way the market works. Imagine a completely crazy teacher in a classroom, who without any rhyme or reason randomly screams at some students, ignores some, rewards a few, and punishes others. A student could hand in a perfect paper and get a failing grade, sometimes more than once, while a student who puts a big “X” in the middle of a single sheet of paper receives a perfect score for what was supposed to be a 25-page essay. It is not that the teacher is actively punishing the good students; there is no pattern at all to the teacher’s actions. Can you imagine trying to learn in such an environment?

This is a problem for traders, because the market is like this teacher; it often rewards incorrect behaviors and punishes perfectly correct actions. You can do exactly the right thing on a trade and lose money several times in a row, or you can make a serious mistake and make a lot of money. The statistical edges in our trading setups become valid only over a large sample size; on any one trial, anything can happen. Especially for developing traders, this random reinforcement, coupled with the extreme emotional charge of both winning and losing, conspire to create one of the most challenging learning environments imaginable.

Random reinforcement is a profoundly powerful tool for behavior modification, and is frequently used to train animals. If you train dogs and reward them every time they obey, their good behavior will probably stop as soon as the rewards stop. On the other hand, if you randomly reward their obedience by sometimes giving a treat and sometimes not, the modifications to their behavior will usually be permanent. (Again, do you see any parallels with slot machines?) It may be counterintuitive, but random reinforcement is actually a much more powerful tool to shape behavior than consistent reinforcement.

There is so much random noise in the market that even excellent trading systems have a large random component in their results. Over a small set of trades, random reinforcement of both good and bad behavior is *normal* for our interactions with the market. Excellent decisions are just about as likely to be met with good results as bad results, and poor decisions will also result in a

number of winning trades. Traders trying to be responsive to the feedback of the market and trying to learn from their interactions with the market are likely to be confused, frustrated, and eventually bewildered.

The market's reinforcement is not truly random; over a large number of trades, results do tend to trend toward the expected value, but it certainly can seem random to the struggling trader. The solution should not surprise you by now: evaluate your trading results over a large sample size, and use statistics to separate reality from your emotional perceptions. Learn from 20 or 30 trades, not one. Make decisions about changing your trading rules based on the results from 50 trades, not five. The market is a capricious teacher.

## EMOTIONS: THE ENEMY WITHIN

As logical and rational as we try to be, there is no denying it: our decisions are made based on a combination of reason, intuition, and feeling, each in degrees depending on our personal makeup and the specific situation. Once again, this is a mode of decision making that has great utility in many situations, but it can misfire in the context of trading and markets. Emotions can create stress that unbalances the brain on a chemical level. Emotions can cause us to overweight and underweight certain factors, and sometimes to make decisions without any reasoning at all. Successful traders have many strategies for dealing with their emotions, but that is the common thread—they have all found a way to integrate their emotions into their trading process. Some deny and control them with iron discipline and try to become logical machines, some seek modes of trading that remove emotion from the decision process, and some embrace their emotionality and actually build their trading process around it; but in all cases, they understand their emotional balance and how to control it within the framework of their work flow.

## Ego

We all have egos. (I am using the term *ego* here in the colloquial sense to mean self-image rather than in any formal, psychoanalytical context.) Everyone likes to be right, likes to be seen as intelligent, and likes to be a winner. We all hate to lose, and we hate to be wrong; traders, as a group, tend to be more competitive than the average person. These personality traits are part of what allows a trader to face the market every day—a person without exceptional self-confidence would not be able to operate in the market environment. Like so many things, ego is both a strength and a weakness for traders. When it goes awry, things go badly wrong. Excessive ego can lead traders to the point where they are fighting the market, or where they hold a position at a significant loss because they are convinced the market is wrong. It is not possible to make consistent money fighting the market, so ego must be subjugated to the realities of the marketplace.

One of the big problems is that, for most traders, the need to be right is *at least* as strong as the drive to make money—many traders find that the pain of being wrong is greater than the pain of losing money. You often have minutes or seconds to evaluate a market and make a snap decision. You *know* you are making a decision without all the important information, so it would be logical if it were easy to let go of that decision once it was made. For nearly all traders, this is not the case because we become invested in the outcome once risk is involved. Avoiding emotional attachment to trading decisions is a key skill of competent trading, and being able to immediately and unemotionally exit a losing trade is a hallmark of a master trader.

Being wrong is an inescapable part of trading, and, until you reconcile this fact with your innate need to be right, your success will be limited. Earlier in this book, I suggested that an appropriate way to look at normal trading losses is not as losses at all, but simply as a planned, recurring cost of doing business. Though many traders feel shame, anger, and hurt over losing trades, this is illogical—the market is so random that it is absolutely impossible to trade without losing. Many good traders are wrong far more often than they are right; trading is not about being right or predicting the future. All you can do is to identify places where you might have a small edge in the market, put on the trade, and open yourself to the possible outcomes.

## Hope and Fear

Scylla and Charybdis were two sea monsters in Greek mythology situated in a narrow strait so that ships had to pass close to one or the other; captains had to choose because it was not possible for a ship to make the passage and to avoid both. For traders, fear and hope are the twin monsters, and no matter how experienced we may be as traders, we are unable to completely conquer them. What we can and must do, however, is to become aware of our weaknesses and our responses to these emotions. If we can monitor ourselves for susceptibility to errors, we can often intervene before the emotional reaction has resulted in a poor decision.

The reasons for fear are obvious. Most traders are afraid of loss, though this is probably rooted in a misunderstanding. It is wrong to be concerned about or to focus on the normal losses that accrue as part of the trading process, but there is certainly the danger of the unexpected and uncontrollable loss from an outlier event. Recent flash crashes have shown that stable markets can have unprecedented sell-offs; who would have thought that a big blue-chip stock could drop 80 percent in a few minutes? Many traders also face deeper, darker fears that are tied in to questions of self-worth, security, and personal finance. Even for a well-balanced person, trading can be a serious emotional challenge at times.

As powerful as fear is, many traders find that hope is actually more dangerous. Hope encourages us to take potentially reckless risks that we might not otherwise take. It can keep us in winning trades long after the profit potential is gone; many traders give back a lot of open profit because they are clawing for even more. Many traders are also loath to exit their losing trades, sometimes even at their predetermined stop level, because they are *hoping* that the trade will turn around and become a smaller loss. Once again, one of the distinguishing characteristics of successful traders is an ability to cut losers with minimal emotional attachment. No individual trader can succeed without mastering both hope and fear.

After many years and many mistakes fighting these twin monsters, I found a solution that works for me. It is deceptively simple, but it is difficult to do consistently. Here it is: *for every trade you put on, immediately assume you are wrong*. This is your baseline assumption, and, if you find evidence to the contrary (that you are right), be pleasantly surprised. This works because it takes



all pressure off you and all hope out of the trade. Normally, once you have made a decision to buy a market, confirmation bias kicks in and you will start to subtly overweight information that supports your position. Instead, think, “I bought it thinking it will go up, but I’m probably wrong.” There is no struggle, no fight against the reality of the market, and also no fear because you are *expecting* to be wrong. This is a subtle shift in your thinking, but it can produce a powerful change in your perspective and your behavior.

# INTUITION

Intuition is an important part of the trading process for many traders and styles of trading. It is certainly more important to some types of traders than to others, but even highly quantitative work benefits from intuitive leaps at some points in the process. Though there is a lot of misinformation and misconception about intuition, the best working definition might be that it is a way of knowing that falls outside rational thought. Someone who arrives at an answer through reason can usually explain every step—how an answer led to another question, which led to another answer, in an unbroken logical chain. When someone arrives at an answer intuitively, the individual will often say that he or she “just knows” or “feels that it is right,” and cannot explain much, if any, of the thought process behind the answer. Intuition works in leaps and bounds. This is not a sign of sloppy reasoning; it is a completely different mode of thought, another way of knowing entirely.

Many developing traders overestimate the importance of intuition, believing that it will cure all of their trading ills. They may think that great traders have a sixth sense that other people do not, that they just trade based on this gut feeling. Some people believe that great traders are born with market sense—either you have it or you don't. Other traders, particularly systematic traders, may believe that intuition does not really exist or that it is unreliable and mostly useful only in hindsight. As usual, all of these viewpoints contain an element of truth, but they are also wrong because they miss some essential points.

## Developing Intuition

There is no magic in intuition. Rather, it is a normal problem solving skill that functions on a level outside of consciousness. As such, it cannot be forced, but it *can* be cultivated—there are things you can do to foster the growth and development of intuition. Everyone has had the experience of working very hard on a problem and being unable to solve it during the work session, and then the answer coming spontaneously after a break or a night’s sleep. The answer seems to come easily and naturally, with no effort at all, but this is not quite true. The sudden flash of intuition is really the result of a lot of hard work and an extended period of focused effort that activated the cognitive machinery on another level. There are two important elements to building intuition. One is repeated exposure to consistently structured data, which is the focus of much of this book. Equally important, though, is that the work be approached in the right emotional context, which is basically an open, receptive, and almost playful attitude. This is something that is so profound, but is often ignored. Most adults understand the need for hard work and focus, but they are not so in touch with the need for novelty and play. Perhaps this is one reason why children find it easier to acquire new skills, particularly in the artistic/intuitive/right brain domain.

There is a large and growing body of research on neuroplasticity, which says that high-level skill acquisition actually depends on physical changes in the brain—the brain rewires itself to accommodate these new skills. There are structural differences, for instance, between the way a chess grandmaster’s brain processes chess patterns and the way a typical person’s brain works. They fundamentally see and think differently because their brains *are* different, and this difference is the result of intense training. This also explains why skill acquisition does not happen overnight: It takes time for the brain to build and reinforce these new structural connections, which requires intense work over a long period of time.

Teachers of high-level skills have known for generations that the correct emotional context and environment facilitate high-level skill development, but they did not realize that students were actually, physically rewiring their brains. Learning should be fun, not only because the student will be motivated to work harder, but because the emotional charge of this enjoyment actually encourages the physical changes needed for skill development. It is very difficult to excel at something unless you love it. This is a real problem for newer traders, for whom the market is an out-of-control emotional roller coaster. Until those emotions are

brought under control, it is impossible to approach the market with the correct, receptive mind-set.

## Where Does Intuition Come From?

There have been many studies in the social sciences and in psychology that have established the reality of human intuition. Focusing specifically on trading and market-related intuition, Bruguier, Quartz, and Bossaerts (2010) structured a set of experiments designed to “better define what is meant by ‘trader intuition,’ and to understand why some traders are better than others.” They did this by creating a number of scenarios representing markets that both had and did not have trading by informed insiders, with the goal of seeing if novice traders could intuit the intentions of these informed insiders through price movements. Perhaps surprisingly, they found that uninformed traders with no experience in financial markets were quickly able to discern the intentions of these informed insiders, based on nothing more than information contained in price changes themselves.

The logical question, of course, is how did they do that? Bruguier *et al.* postulated a connection between traders’ intuition in market situations and a specific ability known in the literature as theory of mind (ToM). ToM is the human ability (perhaps shared by some other primates) to read benevolence or malevolence through the patterns in one’s surroundings—for instance, the ability to read another person’s intentions through eye expression or through moves in a strategic game. Since markets with insiders represent an environment that may be deliberately manipulated against the uninformed trader, ToM becomes a potentially relevant skill. Not only did Bruguier *et al.* find that trader intuition in their market simulations was strongly correlated with tests for broader ToM-based abilities, but it was *specifically uncorrelated* with ability on mathematical or logical tests. Last, they confirmed in brain scans that subjects were activating areas of the brain that have been associated with ToM in previous tests and experiments. It appears that subjects were using highly evolved portions of their brains in new contexts and applications to drive market intuition.

This paper is one of many that confirm the reality of intuition, but these results are particularly interesting because they suggest a fairly mundane explanation for the phenomenon. Intuition is not some mystical skill that only supertraders have; it is a retooling and reapplication of normal human abilities built from our social interactions. However, the most important point is that intuition is not special. Even inexperienced, uninformed traders quickly begin to develop intuition about market patterns (a fact that has been confirmed in many other experiments.) If everyone has it, intuition cannot, in itself, be a source of a trading edge.

## Using Intuition

A discretionary trader is someone who trades based on a strong understanding of the fundamental principles of price behavior. Many outsiders and developing traders assume that discretionary traders rely on a nearly supernatural sense of what will happen next. In general, this is not true, as most discretionary trades are placed according to more or less clearly defined rules. Good discretionary traders have a passion for understanding how the market really works and for what drives unfolding price movements, and they are also willing to let go of preconceptions and theories immediately if they are disproven by the market. All good discretionary traders are statistics junkies, whether they know it or not. Some are attracted to hard-core statistical methods, but many others spend hours studying charts and keeping records and journals of market behavior. What are they doing if not internalizing the patterns of the market? I would suggest that a rigid analytical framework has the advantage of objectivity and scope, but dedicated traders can accomplish many of the same goals with charts, records of their own trades, and pencil and paper.

Even though much can be quantified, most traders will experience periods of knowing that go beyond the statistics. Sometimes there is a strong gut feeling or emotional reaction associated with a pattern; maybe, for instance, you are considering a trade in three markets and one objectively is less attractive on the chart, but you keep coming back to it for some reason you cannot define. It is also common to experience intuition on a longer time frame. Maybe you have a trade that is working well, but you find yourself thinking about it when the market is closed and you are unduly concerned. In each of these cases, this could well be a message from some part of your mind beyond your conscious grasp. It takes an enormous amount of emotional balance and experience to separate the real messages from the noise; this is one reason why the learning curve for traders is measured in years and not months. New traders simply have too much emotion and too many conflicts to be responsive to the still small voice of intuition or to separate it from their rampant fear and greed.

## Trusting Intuition

In general, the most important questions about intuition concern how to balance intuition against reason. There is no simple answer to this; the answer will be different for a trader at different points in her development, for different markets and market environments, and perhaps even for different kinds of trades. In addition, many traders find it constructive to weight intuition more heavily when considering exits from existing trades rather than entries into new trades. The reason is that most discretionary traders find it easier to read a market when there is a position and fluctuating P&L involved. These factors tend to be powerful cues for intuition, but it is also important to guard against emotional distortions due to fear and greed.

The interplay of emotion and intuition is poorly understood. Intuition often communicates its message through sensations in the body, which is why it is often described as a gut feeling. It is ineffable and ephemeral, and it operates on the margin between thought and feeling. The problem is that emotions essentially communicate on this same channel, and emotions can cloud and distort the message of intuition. It is difficult or impossible for an emotional trader to respond to intuition, which is one reason why new traders should actively ignore any intuitive sense and should instead focus on building a rational analytical framework based on the inherent statistical properties of the market. Once the emotional charge is gone from the trading process, intuition will become more trustworthy, and this will probably also come at a time when the trader has finally been exposed to enough market patterns to have begun to develop some valid intuition.

For most developing traders, the most important points to remember are as follows: Intuition is real, but it is not special. Everyone who has interactions with the market quickly develops some degree of intuition, so the presence of intuition is not a trading edge. There are far more people who have intuitions about the market's movements than there are profitable traders. Also, realize that intuition relies heavily on heuristics, so it is absolutely critical that it be trained correctly. Last, realize that it will often not be possible to walk through logical steps that fully explain your intuitive conclusions. In fact, intuition will be at odds with logic and reason at times, creating a dissonance that the trader will have to resolve. Intuition is fallible and will sometimes be wrong, so it is critical that all intuitive impressions are subject to rational review and evaluation.

## Numbers to Leave Numbers

Josh Waitzkin (2008) uses the phrase “numbers to leave numbers” or “form to leave form” to describe his experiences building mastery in both chess and the Chinese martial art *taijiquan*. In both disciplines, students typically spend many years studying fundamentals and basics, focusing on the building blocks of mastery. The chess student may begin by studying endgames where there are only three pieces on the board, and eventually progress to memorizing full games of grandmasters. The novice martial artist spends a lot of time learning to do basic things like standing and shifting weight from one foot to the other.

The journey from fundamentals to mastery is a long one—true mastery does not come until many hours of work have been put in for many years and until fundamentals have been assimilated on an unconscious level. Students may show aptitude early on, but it takes a long time and a lot of hard work in the right environment for even the most talented students to reach their full potential. At the end of this work, intuition grows as a natural result of everything the trader has done to understand the market. All statistical and quantitative studies, every experience in every trade, and every contemplation of market action are folded into a holistic understanding that is true market intuition.

# FLOW

Have you ever been so completely engrossed in an activity that you become lost in it? Maybe you had no sense of time and hours seemed like minutes—you forgot what you were doing, and even the normal, scattered wandering of your mind stopped and you were completely focused on the task at hand. Chances are, whatever you were doing, you did well, even though you might not have been able to explain exactly how you did it. This state of *flow* is a common thread in elite performance, regardless of the context or the field: the professional athlete who sees the whole field at a glance and effortlessly seems to be at the right place at the right time, the professional musician playing an hour-long concerto from memory with effortless perfection, the line cook in a busy kitchen balancing completion of a dozen dishes at a time for hours on end, the video gamer sitting in front of his screen, or the religious mystic sitting on a wooden floor praying for days on end—these experiences are united by a common state of mind. Mihály Csíkszentmihályi (1997) was the first psychologist to seriously investigate this state, though it has certainly been a part of the human experience for millennia. He has identified a few commonalities to the flow experience:

- We are completely focused and completely absorbed in what we are doing.
- There is a sense of great inner clarity.
- The task must have clearly defined goals, so we know what must be done and how much progress we are making toward accomplishing those goals. Feedback is immediate and direct, so that our activity can be readily adjusted to match the task.
- Though the flow experience is connected to complex tasks, we know that our skills are adequate—we are up to the task. There is a sense of easy self-confidence, sufficiency, and no worries.
- There is a loss of our sense of self. We may perceive ourselves becoming one with the task, or even lose sense of the boundaries where our consciousness ends.
- We lose sense of time, and, in some cases, have a feeling of standing outside of time. This, together with the loss of self, sometimes is described as an expansion of consciousness.
- It feels great. Actually, that is a dramatic understatement. Many people report the flow experience as being one of sheer ecstasy. There is an ineffability to the state; many times we are simply unable to find words to



convey the experience and it defies all explanation.

- Because of this, activities that produce flow become their own intrinsic motivation. We are driven to excel in these activities simply to achieve the state of flow—flow becomes its own reward.

## How to Get There

In the flow state, we are supremely competent. Someone observing our performance would remark that we make a complex task appear effortless and easy; this, in fact, is one of the attributes of true mastery in many disciplines. Elite performers do their best work in the flow state, so it is worth our time to consider the nature of this state, how to get there, and how to guard against events that could jeopardize the flow experience. To this end, Csíkszentmihályi, Abuhamdeh, and Nakamura (2005) identified three key conditions that must exist before flow is possible. (I have added a fourth condition based on my own experience.) The presence of these conditions does not guarantee that flow will be achieved, but, without them, it is not possible.

1. The activity must have clearly defined objectives and goals.
2. The task must offer clear and immediate feedback.
3. The performer must have confidence that his or her skills are matched to the task.
4. The experience rests on a set of foundational skills that are assimilated below the level of conscious thought.

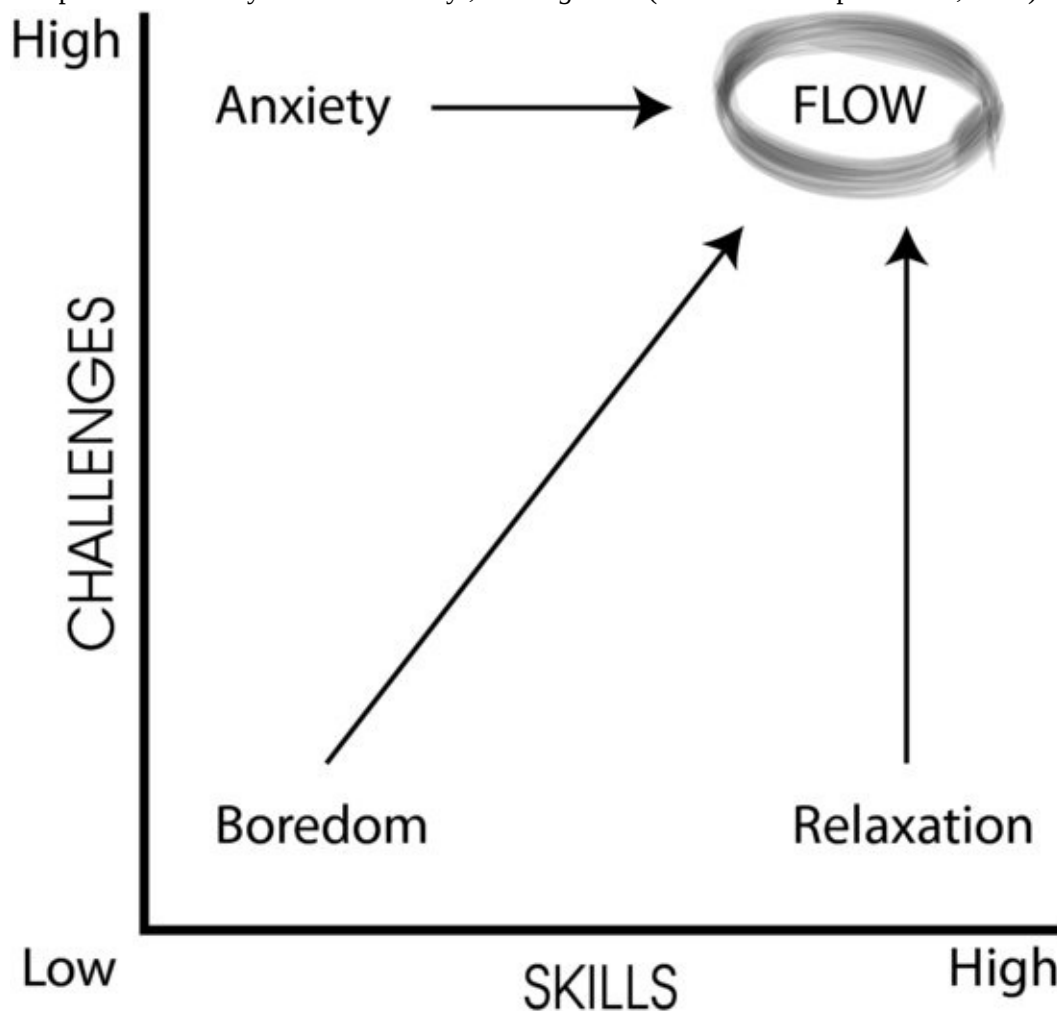
Performance in any complex task contains a great degree of variation, even though this may not be apparent to an outside observer. For the athlete, changing humidity, lighting, or other environmental conditions will play a part in performance. An artist may encounter materials that have slightly different properties due to temperature or composition. Peak performance does not proceed in an unerringly straight line; there is no perfection, even though it may appear so to the outside observer. Constant and subtle adjustments have to be made. Good performers in the flow state make these adjustments easily and naturally—this is possible only because the task offers a constant stream of feedback.

Outside stress can jeopardize the flow experience. Performers in the flow state must be confident that they can handle whatever challenges the experience will throw their way. [Figure 11.1](#) shows a chart adapted from Csíkszentmihályi's *Finding Flow* (1997) that considers performers' state of mind at the intersection of their skills and the challenges of the task. In the lower left quadrant, skills and demands are low, and the performer simply does not care about the task. This is the plight of an office worker who might describe the job as trivial and meaningless. If challenges increase without a commensurate increase in skills

and abilities (moving along the vertical axis of the chart), the performers' stress increases as they realize that they are facing a task for which they are ill-suited, and that, at some point, they will be unable to accomplish it. If skills increase far beyond the challenges present, results may suffer as the performer could actually be too relaxed and comfortable. Interesting things start to happen when extremely high challenges are met with correspondingly high skills; it is here that the performer starts to have the potential to slip into the flow experience.

**FIGURE 11.1** Csíkszentmihályi's Performer State as a Function of Challenges and Skills

Source: Adapted from Mihály Csíkszentmihályi, *Finding Flow* (New York: HarperCollins, 1997).



In my experience, peak performance, the kind of performance that facilitates flow, rests on a strong foundation of completely assimilated skills. The artist has held a brush tens of thousands of times and understands the complexities of paper, paint, and moisture; he has mastered brushstrokes and color to the point

where they are tools that he can draw upon without conscious thought. The master musician has assimilated the technical requirements of her instrument through tens of thousands of practice sessions spread over many years. The expert rock climber seems to have a sixth sense, drawing on a deep understanding of torque, kinesthetics, and the properties of different types of rock that comes only from long experience. The trader has seen enough market action and has done enough statistical studies to know what usually happens when a market closes very strongly three days in a row, with a wider range the third day. There is nothing remarkable about any of these skills taken individually, but their deep assimilation into a whole that seems to be greater than the sum of the parts is one of the hallmarks of mastery.

[Figure 11.1](#) also shows why the flow experience can act as a powerful guide for learning and skill development. Being in the flow state is highly desirable; it feels good and we perform well in this state. Being in that space becomes its own intrinsic motivation and we will naturally do whatever is necessary to return to the flow state when we are pushed out of it. Imagine that you are in the area of the graph where your high skills are meeting moderately high challenges, but not sufficient challenges to fully absorb your attention. In this case, the performer can get back to the flow state by adding challenges and increasing the complexity of the task. Similarly, if the performer is in the space where high challenges are met by skills that might not quite be up to the task, increasing the level of those skills will move the performer back into the potential flow zone. It takes energy, attention, and focus to achieve this flow state, but its presence can be a powerful clue that the performer is in an optimal state to learn, to grow, and to develop new skills.

## The Role of Attention and Focus

In the normal world, our minds are usually scattered. It is not unusual to be doing a task and to be thinking about several other things; in fact, multitasking is considered an asset in many professions. The problem is that we have only so much mental bandwidth, and it is hard to draw a line between multitasking and being distracted. There is the risk that when we focus on many things at the same time we will do many things, but do nothing well. Part of the beauty of flow is that we are completely focused when in this state. In fact, one of the mechanisms that have been proposed to explain the flow state is that it occurs when all available cognitive capacity is focused on one single point, a most unusual state

of mind in our daily lives.

This state is not unfamiliar to meditators and religious aspirants. Many of the world's religions include a practice of repeating a mantra, a short phrase or prayer, over and over until it completely fills the field of awareness and much of the conscious mind shuts off. Mystics have reported that this is one route to achieving enlightenment and that a sense of religious ecstasy often accompanies this practice after many hours or days of this kind of focus. In the East, elaborate mandalas were created as aids to meditation. By focusing visual attention on one part of the image, the meditator was again able to enter into a state of higher consciousness. In yet another example, many meditative techniques revolve around ideas like focusing attention on a part of the body or on the breath as it goes in and out of the body; again, this is designed to achieve a single-point focus of attention.

One of the prerequisites for achieving flow is absence of distraction and complete focus on the task at hand. Whether this is evening chart review or screen time during the day, structure your environment to minimize distractions. Turn off the television, avoid Internet chats, do not check e-mail, and sequester yourself physically. It is important to do all of this with the right mind-set. Flow cannot be forced. You cannot try harder and work competitively to achieve the flow state. In fact, it flourishes in an almost playful environment of open-minded wonder, so it is not by chance that this is also the environment that is most conducive to learning and skill development. When we are in the state of flow, we are at our best, and our trading becomes something greater than the sum of the individual skills and parts.

# PRACTICAL PSYCHOLOGY

Much has been written, here and elsewhere, about the psychological issues traders face and the right mind-set with which to approach trading problems. This is a complex subject because traders at different stages in their development will have significantly different challenges and needs. Different personalities will deal with the stresses of trading in significantly different ways, so solutions that might have relevance for one trader might fall well short for another—it is dangerous to make sweeping generalizations.

Psychological work is no substitute for actually having an edge, and proper psychology is not an edge in itself. No matter how hard you try, how much you focus, or how much you practice, you are not going to be able to flip a fair coin and make it come up heads more than about half the time, which is essentially what many new traders do. Many new traders are trading methods and ideas in the market that do not have an edge and, rather than rectifying the real problem, they focus on the performance insights of trading psychology. Much of the time new traders spend on psychology would be better spent understanding the true nature of the market's movements.

For developing traders though, the situation is different. Once you have a method that has an edge in the market, it is impossible to apply that edge without having the proper mind-set and attitude. Traders find themselves making many strange mistakes that compromise their results, and these are often due to psychological issues. Dealing with the psychological stresses of trading is one of the core skills of competent discretionary trading, and it is something that requires ongoing maintenance throughout a career. No one is ever immune to psychologically driven errors. For more experienced and developing traders, it does make sense to focus on this area, perhaps even seeking the help of a qualified professional in the field.

Most of the suggestions that follow are for the self-directed trader working alone or in a team and, ideally, with a mentor. For institutional traders, portfolio managers, and quantitative system designers, your situation may be different. You will still be inclined to make these same errors, but the constraints of your job or the institutional framework may define your role well enough that your behavior is restricted. You may still find insight in understanding the issues self-directed traders face, because these reflect the psychology of the market and

price movements at important inflection points.

## Develop an Approach That Fits Your Personality

Who are you? It has been said that if you don't know the answer to this question, the markets are an expensive place to find out. This is true, and many millions of dollars and years of people's lives have been wasted because they were trying to trade methods or markets that were a poor fit for their psychological makeup. One of the secrets to managing yourself psychologically is to pick a trading style that plays to your strengths. So, once again, who are you? Some people make decisions intuitively and quickly, while others tend to prefer long debate and a careful weighing of all relevant factors. Some traders are naturally inclined to be more aggressive and active, while others prefer a more sedate pace. Some developing traders have serious constraints on their time and are not able to monitor markets intraday, whereas others can sit at the screen every minute the market is open. Some traders may have backgrounds and experiences that make certain markets more interesting or attractive to them. For instance, a trader who grew up on a farm will probably have natural inclinations toward agricultural markets that might be alien to a trader with a strong background in accounting and corporate finance. Every piece of their trading methodology and trading plan must be shaped by who the trader is.

## Choose a Market

The choice of which markets to study and trade is an important one. Many retail traders are drawn to foreign exchange, but this is probably because of the extremely low account balances required to open a forex account. This is also unfortunate because the forex markets tend to be the most random and least predictable of all the major markets in many time frames—it is difficult to derive a quantifiable short-term edge in the currency market. One reason might be that a lot of the activity in the forex markets is driven by a complex web of factors and much of the activity in these markets is secondary.

Futures are also problematic for many new traders, because even with mini contracts, considerable risk capital is needed to navigate these markets. A stock trader might be able to start trading and, using odd lots (odd lots are less than 100-share lots), might be able to limit her entire risk to \$10,000, risking perhaps \$50 on a trade. It takes a long time to lose \$10,000 in \$50 increments, which is exactly how the beginner should be thinking. For most futures traders, \$50,000 is probably a realistic initial risk to allocate to their learning period. Many traders are drawn to stocks because they come from investing backgrounds and owning stock is intuitive, but these traders are at a disadvantage because *shorting* stocks also needs to quickly become intuitive.



## Choose a Time Frame

The primary question here is do you want to *day trade*, swing trade, or invest for the long haul? Details of whether you want to use 10-or 15-minute bars are considerably less important than this big-picture time frame decision. There are advantages to day trading, especially for the new trader. A swing trader might see a few hundred patterns in a year, but a day trader will see hundreds in a single week. The immersion and focus on pattern assimilation can result in a greatly accelerated learning curve, provided the trader can enter into the right psychological state to take advantage of the opportunity. In addition, the more times you apply a statistical edge, the more consistent and larger your profits will be; no other time frame offers as many “at bats” as day trading does.

However, the costs and challenges of day trading are severe; the impact of transaction costs alone presents an insurmountable barrier for many traders. For instance, imagine a trader with a \$250,000 account who does 10 trades a day and who likes to trade stocks in the \$150 to \$200 range that might have, on average, \$0.05 spreads. Furthermore, assume this trader pays \$0.001 commission per share and no exchange or electronic communication network (ECN) fees on balance. (These are extremely favorable assumptions.) Last, assume the trader consistently bids or offers for his exits and enters trades with market orders, so he is paying the spread on 50 percent of the shares he trades. If he does 10 trades a day on 1,000 shares, transaction costs will total \$502 a day, meaning that he has to make about \$126,000 a year *just to cover costs*. This is a 50 percent annual return, again, just to break even. To put that in perspective, the Renaissance Technologies Medallion Fund, widely considered to be the best of the best, has averaged an annual return just under 40 percent since its inception; traders and funds that can make 25 percent a year are rock stars in this industry. This is a tremendous *vig* for the new trader, so consider this carefully.

The other issue with day trading is that the psychological demands are extreme. Day traders ride the complete emotional roller coaster from euphoria to despair, usually several times in a single trading day. Unless you have the emotional control of a Buddhist monk, day trading will play on every psychological weakness you have, and you will frequently find yourself under a degree of stress that challenges the open receptiveness needed for optimal learning. I am not saying that no one should day trade, but you need to be aware of the costs and challenges of this type of trading.

On the opposite end of the spectrum are *long-term investors* who intend to hold positions for years. For many of these players, a month is a short time frame and they consider anything on the weekly chart to be pure noise. At this level, infrequent trading and position adjustment become barriers to the trader who needs to assimilate patterns and to learn to make decisions. It is not that technical patterns do not work in the long term. The balance of mean reversion and range expansion is a little different in some time frames, but technical tools retain their validity even at long time horizons. The problem for the long-term investor is that you will not get to see them work very often and it is difficult to build intuition about the market's movements if you are making only a few decisions a year.

In the middle of the spectrum are the swing traders. Properly, the term *swing trading* does not define a specific time frame, but rather a specific style of trading—looking to target and to profit from one specific swing in the market, usually the next one, while tolerating as little pain as possible. A swing trader will attempt to position long as the market turns into an uptrend, and will usually not be interested in sitting through retracements in that trend. Some swing traders may aim for holding periods of two days to two weeks, while others may look to hold for two weeks to three months, and still others may focus on swing trading hourly charts with holding periods ranging from a few hours to two days. For many traders, the swing trading approach in an intermediate time frame of several days to several weeks offers an excellent balance: Trading is frequent enough that learning takes place quickly, and most analysis can be done outside of market hours, minimizing the decisions that must be made under pressure. This has the dual advantage of allowing the trader to enter into an open, receptive state, while also allowing time for deep reflection and analysis of the patterns being considered.

## Choose a Style

Though there are a thousand subtleties to a trading style, and every successful trader creates a style that fits some key elements of his or her personality, there are two key questions to consider: are you a trend follower or countertrend trader, and do you want to be a scalper or hold for bigger moves? It is impossible for a new trader to answer these questions without some exposure to markets and to the actual trading process; the answer may change for a trader at different points in a career, but finding the answers to these questions is a key part of knowing who you are as a trader.

As a group, most traders have strong personalities, are opinionated, and are contrary to the extreme. As a result, they also tend to be distrustful of consensus and groupthink, and most traders find that fading (going against) moves comes more naturally than following the trend. In addition, there is a tendency to regard markets that have made large, sudden moves as being mispriced, either on sale or ridiculously overpriced. However, traders who would focus exclusively on fading moves need to deal with an important issue: with-trend trades are usually easier and offer better expected value than countertrend setups. The most effective fade traders lie in wait until markets reach ridiculous emotional extremes on the time frame they are trading, and then they pounce. This requires extreme patience, discipline, and maturity. If you go into the market constantly looking for opportunities to fade, you will find them, but you will often be steamrollered as markets simply keep going. The crowd may be dumb, but they are often right and trends can go much further than anyone would expect.

There are advantages to trend following: with-trend trades tend to be less transactionally oriented, and it is possible for a single successful trend trade to make many multiples of the amount risked on that trade. However, trend traders will accumulate many small losses while they work to find the one market that will trend. It certainly is a viable strategy, but it is not the answer for all traders. There are strong statistical tendencies for mean reversion, and traders working a disciplined approach to fade trades may find that they can achieve higher returns and more effective deployment of capital, albeit at the expense of much harder work and many more transactions.

*Scalping* refers to a style of trading that focuses on a large number of very small trades. We usually think of this on very short time frames, but it is also possible to scalp on a daily or higher time frame; the key is simply that the

expected profit or loss is a very small percentage of the average-sized move on that time frame. Scalpers are exposed to very high transaction costs, and are rarely involved for the big swing. Scalpers may take five cents out of an intraday swing that moves two or three points. So, why scalp? The best answer is that some people and some personality types are good at scalping, and it can offer these people consistent profits. If you believe you want to be a scalper, realize that these edges have been significantly eroded in recent years by more efficient market microstructure, and the game could well be completely over for the human trader within the next decade. Many traders choose to scalp because they lack the discipline to wait for actual trade setups—but this is not a good reason to scalp. If you choose to scalp, do so because it is the right answer for your personality, not because you are undisciplined and impatient.

Let me share my personal perspective on these questions: the best answer for most traders is to reach some kind of middle ground. Though traders should focus on a handful of patterns to trade, especially at first, it is probably best if some of those patterns are with-trend and some are countertrend. If you have only one set of tools, you will tend to force every market pattern into the context of that set of tools. If you trade only countertrend trades, you will always be looking for places to fade. If you trade only with the trend, you will ignore the spots when trends might be overextended and will always be focused only on finding the next spot to enter with the trend. In other words, if the only tool you have is a hammer, every problem you encounter will look like a nail!

## Discretionary or Systematic?

The choice between *discretionary trading* and *systematic trading* is also important. This book has been written for the discretionary trader, but some traders may discover they are more suited for a systematic approach. They may find that they are not good at handling the stress of making decisions under pressure and that they function better in an analytical context far removed from the heat of battle. These traders are not doomed to failure, and they could be well-equipped to do quantitative system development. Some traders also find success with a hybrid approach, utilizing a trading system and making intuitive interventions in that system's decisions at critical points. A word of warning is in order here: If you are going to do this, carefully monitor your hybrid results and compare them to the raw system results to be sure that you are actually adding something of value. Many traders who do this intervene based on their emotional reactions to risk, and their actions are rarely constructive. Another point (which

would seem to be obvious) is that your system must actually *work* and must actually show a profit after all costs are considered. If your system does not show a solid track record in properly done backtests and forward tests, it probably will not work in the market.

Also, if you choose to be a discretionary trader, carefully consider why you made that choice. Many discretionary traders avoid the systematic route because of laziness or because they lack the quantitative skills to really understand system development. This is a mistake. Discretionary trading is probably the *hardest* trading there is; it takes more work, more time, more analysis, more self-reflection, and more self-control to achieve success in this arena than in any other type of trading. In addition, if you are a discretionary trader, *you* are the most important element of your system. Any outside stress—whether it be illness, financial problems, relationship problems, sickness, or injury—that compromises your emotional balance can seriously jeopardize your trading results. Good discretionary traders who find success over the long haul develop a system to monitor themselves and their emotional state, and usually reduce their risk at times when they are not at their peak performance level.

## SUMMARY

Though I have made this point repeatedly throughout this book, it bears repeating here: one of the most important keys to successful trading is consistency. Consistency applies to your actions and interactions with the market, but also to seemingly mundane points like your daily schedule, record keeping, analysis of your results, and review of your journals. Good trading is, to a large degree, boring and predictable. This is another key reason that many traders fail: they are drawn to the markets and to trading by what they perceive as a challenging, glamorous adventure, and are unable to make the adjustment when confronted with the reality of competent trading, which is very different. If you are seeking excitement in the market, you will find it. Trade too much risk on one trade, take reckless entries, skip a few days' review of your positions, put on large size before an impending economic report—any of these things will generate an exciting outcome, but probably not a good one. Creating excitement is often at odds with creating profits; good traders strive for consistency first and foremost.

Consistency is important from at least two perspectives. First, it is not possible to evaluate the efficacy of any trading system or rule set if you are not applying it with perfect consistency and discipline. Imagine that you have a trading system that is performing poorly but you are also trading it inconsistently; the bottom-line results are a combination of both the system's actual performance and your own inconsistent application of that system. It would be extremely illogical to make adjustments to the system rules based on this performance, but this is an error many developing traders make. The market is such a random environment that your first task should be to remove degrees of freedom affecting your results. If you are a self-directed trader, this should be the focus of your early development: remove degrees of freedom whenever possible. If you are an institutional trader, the confines of your job description will take care of this mandate, which is one reason that traders in clearly defined roles develop competence much faster than most self-directed traders. Second, for traders in both roles, consistency in your planned study times, review, and even specific screen setups will foster the rapid assimilation of market patterns on a deep level, quickly leading to the growth of real market sense and flow.

# APPENDIX A

## Trading Primer

At first glance, the process of making a trade seems to be simple. Someone wanting to buy an item meets with a potential seller, they agree on a price, and money is exchanged in return for the item. Even the most complex trading ideas begin with this concept. The mechanics may be much more complicated—perhaps the buyer and seller negotiate through a sophisticated electronic medium. Perhaps the item is actually a sophisticated financial instrument or set of instruments. Perhaps there are complications such as currency adjustments or financing costs to be considered, or perhaps the transaction is merely arranged to occur at a future point in time. Regardless, this basic meeting of buyer and seller—weighing of value against value—is the very essence and the root of all market activity.

Many books begin by saying that a trade occurs when a buyer and a seller agree on value, but this is not entirely correct. If this were so, if the parties truly agreed that the price represented the fair value of the asset, that one was equal to the other, wouldn't they each be willing to immediately unwind the trade and even to take the other side? This is almost never the case. In simple buying or selling transactions (excluding spreading and hedging, which we will get to in a minute) the buyer is willing to part with the money because he believes the asset will offer him more value in the future than the money he gave up. The seller has made a decision that the utility value of the money she will receive exceeds the value she would get from continuing to own the asset, so each participant has made an assessment of value that might be unique to his or her particular situation at that point in time. Rather than an agreement, each and every trade that occurs in the market represents a *disagreement* over the value of the money and the assets being exchanged.

### THE SPREAD

We often hear language like “The stock of company XYZ is at \$50,” but even here we have an issue, for there is rarely only one price to consider; usually there are at least three. In active, liquid markets, there is a *bid* price at which buyers

are willing to buy an asset, an *offer* (or *ask*, from *asking price*) at which sellers are offering to sell, and usually a *last print* (or simply, *last*) price where a trade was made. In a typical market, bids will be lined up below the market (more buyers are willing to buy at lower prices), and offers will be stacked at higher prices. The *inside market* refers to the highest bid price and the lowest offer, representing the best available price at any time, and the distance between those two prices is often referred to as the *spread*.

In the hypothetical case of XYZ that just traded at \$50, we might find that the best available bid is \$49.95 and the lowest offered price is \$50.05. A trader would verbalize this situation as “49.95 bid, offered at 50.05,” which is usually shortened in practice to “49.95 at 50.05.” If the trader is reasonably sure the person he is speaking to knows the approximate price, he may drop the *handle* (the whole number) part of the price and just give the decimal pricing. As prices change rapidly, this can lead to a dialogue like “95 at 05 [meaning .95 and .05], at 7, at 9, 98 bid, now at 06.” Though the last trade may have been at \$50, there is a reasonable chance that we could not execute at that price in this situation with the market “95 at 05.” In fact, it is even possible that the last print was 50.00, and now the market may have moved to 50.50 at 50.60. A buyer, in this case, has little hope of executing at any price under 50.50; the spread is often a better reflection of actual value than the last print.

Some traders glean a lot of information from the spread. For instance, the size of the spread is often a measure of the uncertainty in the market; when prices are changing rapidly, market participants often react by widening the spread. Buyers are not aggressive in paying high prices because they know the market could move against them in the next instant, so bids tend to drop lower. At the same time, sellers also react by lifting their offers to higher prices. There is other information in the spread: how rapidly it moves, exactly how it moves (do sellers lift offers higher or do buyers aggressively bid higher?), how much size is displayed, and many other subtleties.

If this seems like a lot of time spent on something very basic, you’re right; it is, and it is also very important. The spread represents a very real cost of trading. Imagine that a buyer pays the offer, and then immediately realizes he has made a mistake and wants to get out of the trade. This can be done only by turning around and selling to the buyers on the bid, so the spread is a source of risk and a cost of trading in every transaction. It is also usually the best estimation of the actual market value of an asset. In the case of a very active stock that prints a trade every few seconds, the inside market is rarely very far from the last print,



so the last trade is a very good approximation of value. (This kind of stock will usually tend to have a relatively tight spread as well.)

However, there are some instruments that may go days without trading (some stocks, options, distant months of futures contracts, for instance). In these cases, the last price may be completely irrelevant because it happened so long ago that the market has moved. To further complicate matters, very inactive, illiquid instruments will often have extremely wide spreads. If stock XYZ last printed 50.00 three weeks ago, but is now bid at 30.00 and offered at 49.00, what is it actually worth? Researchers studying price patterns need to be careful because printed price records in illiquid markets can be very misleading. As an interesting aside, a major factor in the 2007–2008 financial crisis was the importance of many financial instruments representing very significant financial commitments that did not have liquid markets. Spreads were wide, or in some cases, nonexistent, so it was impossible to derive a market value for many of these assets. In the absence of a market price, traders resorted to building complex models with many moving parts (if that sounds a lot like guessing, you're not wrong), and many of these models gave very misleading values for these instruments. This complete breakdown in understanding the value and risk of these instruments was one of the major contributors to the crisis.

*Liquidity* is a misused and often imprecisely defined term, but it usually means the availability of willing buyers and sellers. Liquid instruments tend to have tighter spreads and *deeper books*, meaning that there are many buyers and sellers at price levels beyond the inside market. Going back to XYZ, which is now 49.95 at 50.05, we might find there are 1,000 shares on the bid at 49.95, and many thousands at 49.94, 49.93, and so on for many pennies below the market. Imagine a very large sell order comes into the market. These buyers would easily be able to absorb that order, meaning that XYZ would trade on the bid at 49.95, then maybe 49.94 and 49.93—all in all, very little price change. However, imagine a second scenario where there are again 1,000 shares on the bid at 49.95, but now a few hundred at 49.91, a few more at 49.87, and so on. If a large sell order hits this market, it will “clear the bids” and the price will drop much lower.

*Market makers* are a specific group of traders whose job is basically to provide liquidity. A market maker will usually have both a bid and an offer in the market, though they are free to adjust those levels as needed. For instance, if market makers are getting hit on the bid so that they are accumulating large long positions, they may choose to still bid for the stock, but to drop their bid to lower

levels. If they keep their offer price on the inside market (meaning that they adjust their offer so that it is the lowest offer), eventually they will be able to sell some of their inventory, and in this way manage their exposure. Floor traders in open-outcry markets were the original market makers. Early electronic markets had designated market makers, but this role has now passed to many firms who run computer programs (algorithms) that function as market makers.

Market makers incur significant risks at times because they will always be on the wrong side of big moves driven by informed traders. If a group of traders comes into the market with many buy orders, the market maker will be forced to short to take the other side of that trade. In extreme cases (e.g., the crash of 1987), market makers could be forced out of business by adverse price moves. Market makers are typically offered various incentives to compensate them for these risks; otherwise, no one would take this job! (As of this writing, in 2011, liquidity rebates, which pay the firm a very small fee for executing via limit orders, are one of the primary forms of compensation for most traders functioning as market makers.)

## TWO TYPES OF ORDERS

Traders wishing to buy this market have, broadly speaking, two options. A buyer who is not really in any hurry might focus on getting the best (lowest) price he can get, so he can *bid* for the stock. (In this case, bid is used as a verb meaning “to place an order lower than current prices.”) Consider the case of XYZ with the market bid at 49.95 and offered at 50.05; a buyer could *join the bid* and put his order at 49.95. Of course, the buyer can also place orders lower, but they will be filled only if the market moves down to the level where he is bidding. If the buyer is feeling a little more urgency, he can *step in front of the bid* and put his order at 49.96 or 49.97. Note that in this case, the inside market would now be 49.97 (still offered at 50.05). This is a natural force that tends to compress spreads as buyers bid slightly higher and sellers offer lower in competition for fills, and is one of the main reasons why active, liquid markets tend to have tight spreads. However, if the buyer is really motivated and must have stock XYZ now, he may choose to *pay the offer* (other common language is *take the offer*, and the reverse is to *hit the bid*). Though much simplified, these are the two options available to traders and they correspond to the two most commonly used order types.

*Limit orders* are orders where buyers try to buy at a cheaper price than the

offer and sellers offer to sell at prices above the bid. A trader wanting to buy XYZ with a limit order might say, “Bid for it” or “Join the bid,” as in “We’re in no hurry here—just bid for it.” A seller might say, “Okay, fine, offer it out. Put it up on the offer.” *Market orders* are orders that will execute immediately. Buyers will pay the offer and sellers will end up hitting the bid. These orders usually reflect some degree of urgency—the order must be done immediately and a better price (trade location) is sacrificed for speed of execution. Though the buyer bidding with a limit order will get a better price if filled, the trade-off is that the order may never be filled if the market moves higher.

Now we have arrived at something subtle and very important. Imagine XYZ is again 49.95 at 50.05, and then it trades at 50.05. What just happened? A buyer wanted to buy the stock so much that he was willing to *pay the spread* or take the offer; we can say that this is a buyer-motivated trade. By analyzing the number of orders that hit the bid (seller-motivated trades) compared to those that take the offer (buyer-motivated trades), whether through computer-aided analysis or careful observation, traders can get a deeper sense of the conviction levels and urgency behind price moves. For instance, a stock may move from 50 to 51 in a series of back-and-forth motions with orders printing on both the bid and the offer. At another time, the same price change could occur in a straight line as buyers keep paying the offer and keep that buying pressure on the offer for the entire move. Simple observation would note that both moves began at 50 and ended at 51, and perhaps even occurred in the same amount of time and with the same amount of volume being done, but each of these moves suggests something different about the underlying conviction in the market.

A trader who buys something in anticipation of it going higher is said to be *long* that instrument. For most people, this is a natural and intuitive concept: buying something relatively cheaply, planning to sell it later for a higher price, and pocketing the difference (minus any costs of financing or insurance incurred in the interim). One of the divisions between professional and amateur traders is that professionals are often just as willing to *go short* (or just to *short*) a market, but the public often has a bias against shorting. There are several reasons for this; most equity traders have a natural inclination toward owning stocks, and think that shorting is a very complex transaction, or that it is somehow immoral to bet on a company’s value going down. (In some markets it is theoretically complex, as the instrument must first be borrowed, then sold, later bought back, and finally returned to the lender.) This prejudice is unfounded and is one of the key differences between the public and most professionals. Shorting is nothing

more than the opposite of being long. Whereas the buyer seeks to make a profit as prices rise, the short seller anticipates falling prices and hopes to *cover the short* (buy it back) at lower prices. Short selling is an important part of the trader's tool set.

## Spread Trading

It is also worth considering that a certain amount of the buying and selling pressure in the market represents more complex interests than simple buying and shorting. Imagine a farmer who knows he will have a grain crop coming in September. This farmer might sell his grain in the futures market before the harvest comes in (technically, a short sale), but this does not in any way mean that he expects that prices will be going down. This is a simple example of a *hedging* transaction, and more complicated examples exist in all markets.

*Spread trading* is another type of transaction involving buying one asset and selling another, looking to profit from the change in value between the two. Imagine that a trader feels that Assets A and B should trade in a more or less predictable relationship, perhaps with Asset A at a premium due to production costs and so forth. This trader could track the spread, or the difference between Assets A and B. If she feels that the premium is too small, she can go long the spread by buying Asset A and shorting Asset B. This is not a bullish or bearish bet on either of the assets, but a bet that the spread between the two will widen. She will make money if A goes up and B goes down, if they both go up but A goes up more, or even if they both decline as long as B declines more. The key is that the percentage change of A must be greater than the percentage change of B (assuming an equal-weighted position) from the time the trade is entered. Conversely, if the trader felt the spread was too wide, she could short the spread by doing the reverse of this transaction.

This just scratches the surface of these complex, multileg transactions, which exist in and between all markets in virtually unlimited combinations. The message here is that much of the buying and selling we observe in markets may be part of spread trades like this. In this case, we might see the trader buying Asset A and assume she was bullish on it, when in fact, she does not care if it goes up or down—all she cares about is the spread relationship. Spreads can be created between different asset classes, regional markets, or international markets, and these trades can even be initiated with different timings on each leg. Do not assume that buying is always bullish and selling is always bearish;

there may be much more going on behind the scenes.

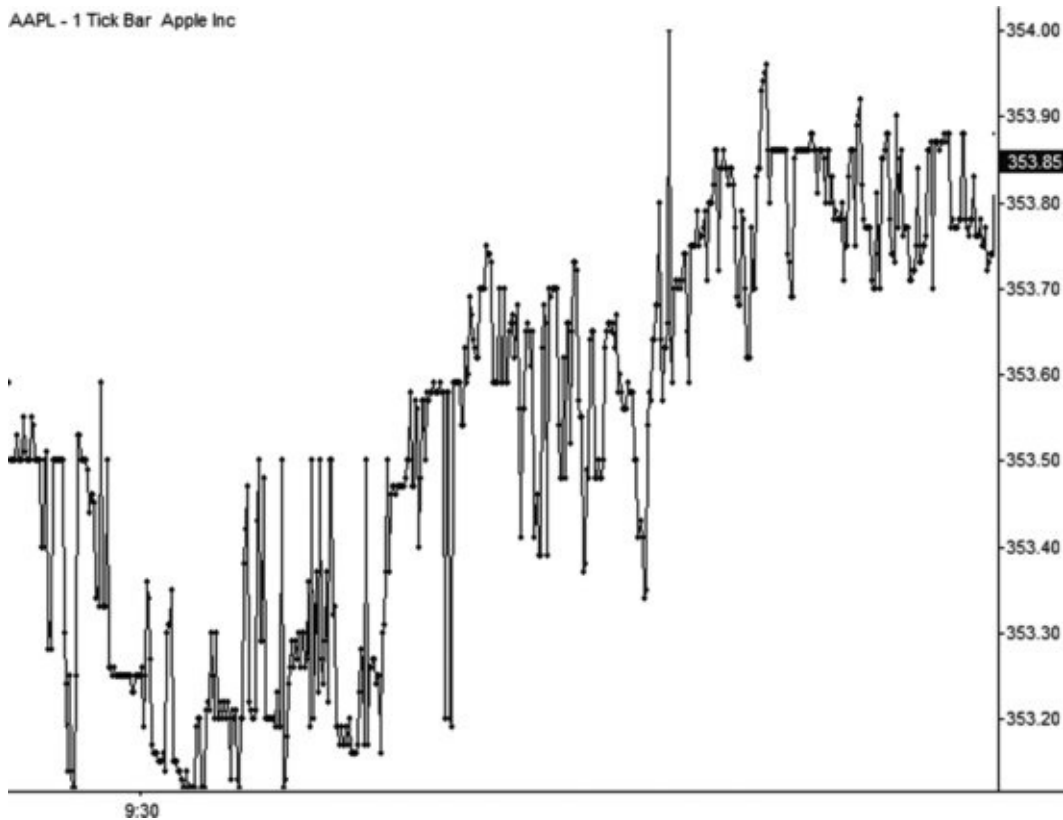
## CHARTS

The most basic language of the market is price changes, perhaps with associated volume. In the case of XYZ, we might see 500 shares done at 50.00, 300 @ 50.03, 500 @ 50.04, and so on. (A more complete record would include a time stamp and whether the order was executed on the bid, on the offer, or in between.) This record is sometimes referred to as the “prints on the tape” in memory of the old-style ticker tape machines, which really did print prices on paper tape. A very active instrument can “print” hundreds or thousands of trades in a single minute, so a trader would quickly become lost without some reference of historical activity. A chart of these price changes is the natural solution, and many discretionary traders find that charts present market information in a way that is both intuitive and useful.

### Tick Charts

The most primitive type of chart would simply be the information in the prints plotted on a graph with price on the y-axis and trade number on the x-axis. The chart in [Figure A.1](#) is a *single-tick* chart of the market’s opening for Apple, Inc. (Nasdaq: AAPL) on 7/12/2011 (trade numbers not shown). The single-tick chart is interesting from an intellectual perspective because it is the most fundamental language of the market—every single trade, every transaction that hits the *consolidated tape*, is displayed on the chart. From a practical perspective, a single-tick chart is not very useful, for the simple reason that it is difficult to fit much trading history on a single chart. This AAPL chart shows only the first 30 seconds of the trading day. In an extremely active stock, it is even possible that less than a single second’s trading could fit in the same space; it is not possible for the human eye and brain to process this information in a meaningful manner.

**[FIGURE A.1](#)** A Single-Tick Chart of AAPL



The obvious solution is to aggregate many ticks into a single space on the chart. When this is done, we refer to the chart by how many ticks (trades) are put together into a single space on the x-axis. In [Figure A.2](#), each bar represents 25 individual trades, and, now, approximately five and a half minutes of activity fit on the same chart space. It is important to remember that the x-axis is not scaled to time. This is one of the main advantages of aggregate tick charts: as the market becomes more or less active the x-axis expands or contracts to accommodate the activity. In many cases, this can create some advantages over simple time-scaled charts by making readable patterns out of very illiquid or extremely volatile markets.

**FIGURE A.2** A 25-Tick Chart of AAPL



## Bars and Candles

Once we start aggregating trades on the x-axis, a graphical device is needed to explain the activity in that space. One logical solution is simply to plot a vertical bar, with the top and bottom of the bar representing the high and low extremes reached during the period (right panel in [Figure A.3](#)). Traders often find it useful to mark the first trade of the period with a tick on the left side of the bar (the *open*) and the last trade of the period with a tick on the right side (the *close*). These four data points, plotted like this, create the classical bar chart. An alternate format is the *candlestick chart*, which prints a wide body between the open and close of the bars, with thinner *shadows* (also called “tails” or “wicks”) above and below the body, reaching to the high and low of the period (left panel in [Figure A.3](#)). Candlestick charts were first used in medieval Japan for rice trading, so much of the terminology associated with patterns of candles is also Japanese. Traditionally, the body of the candle is filled in if the close is lower than the open and left empty if the close is higher than the open. Modern charting software packages usually fill the body of every candle but change the color to something intuitive like red for downward-closing candles and green or blue for upward-closing candles.

**FIGURE A.3** Comparison of Bar and Candlestick Charts



## Time Charts and Other Options

Though the strength of tick charts is their ability to adapt to activity levels in the markets, traders and analysts often prefer a format where each bar corresponds to a predictable unit of time. These time charts are by far the most commonly used in most applications, and are especially useful for traders looking at daily and longer time frames. The chart is referred to by the length of each time unit (as in a 5-minute chart), which may also be called the *time frame* of the chart. Many traders choose to look at different time frames (for instance, 5-minute, hourly, and daily charts) for the same market to get a better sense of the forces affecting prices at any time.

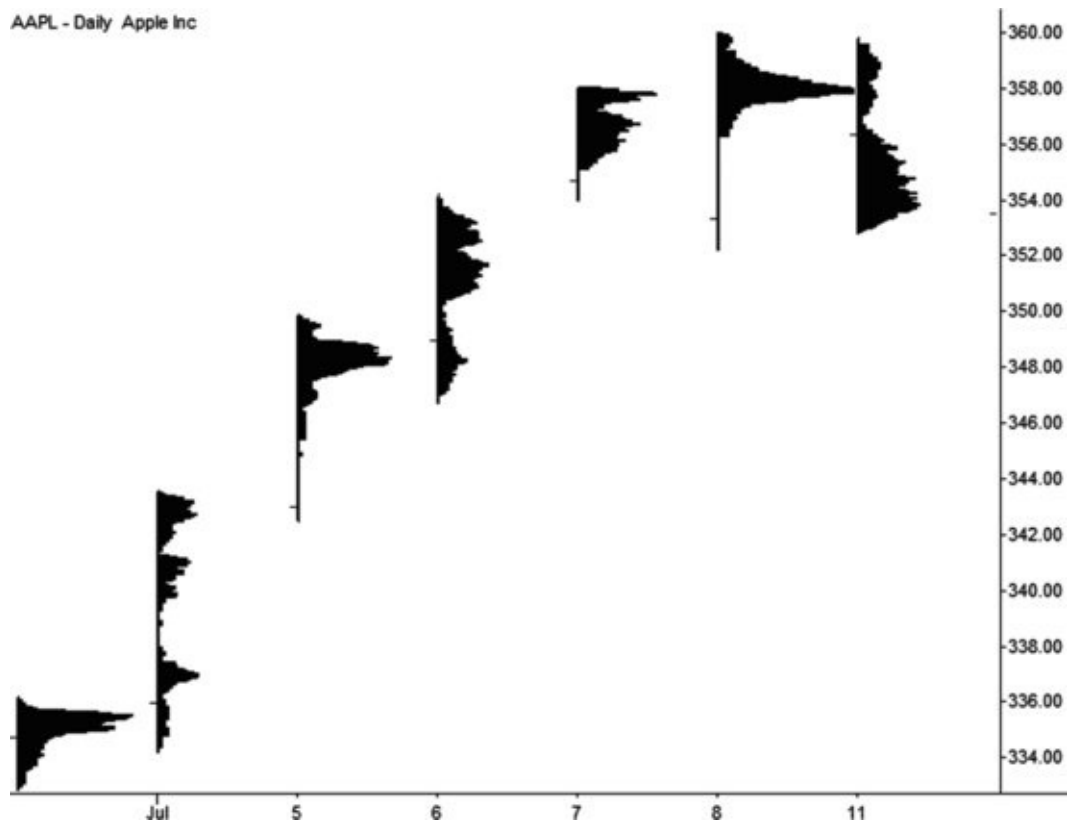
There are other possibilities for scaling the x-axis, but these tend to be less used except in certain specific contexts. It is possible to aggregate bars not by ticks (transactions) but by trading volume. In this case, a bar would contain a certain number of shares or contracts, after which the next bar would begin. Another possibility is to have each bar end after a certain range is reached, so that, for instance, each bar would be 0.25 wide. (Be aware that the range bars created at the end of a trading day will be different from the ones created as the



market unfolds. This makes backtesting and analysis on range bars virtually impossible.)

Other types of charts include swing charts, point and figure charts, kagi charts, line charts, and many others, but these are much less common and are outside the scope of this primer, with one exception. One other chart worth mentioning is Market Profile, created by Peter Steidlmayer in the 1980s. Market Profile charts essentially allow the trader to look inside the bar to see where most volume and trading activity occurred in the time period. Market Profile displays this information in a graphical format attached to the right of each bar, with wider horizontal bars indicating more trading activity at that price level. (See [Figure A.4](#).) While most charting methods only reprocess the same open, high, low, and close (OHLC), volume, and open interest information, Market Profile is an important innovation—it adds detail and perspective that is not visible on a standard chart.

**FIGURE A.4** Market Profile Chart of AAPL



## **APPENDIX B**

# **A Deeper Look at Moving Averages and the MACD**

The charts and the discussion that follow may look a little strange, but the thought process is important. Too many times, traders use indicators or tools on their charts that they do not understand. Rules are developed based on the action of a squiggly line without fully understanding what that line measures and represents. Though some traders will find some success with an approach like this, it misses much of the potential in these tools. To fully understand a technical tool, it is useful to peer deeply into its construction, and to understand how it reacts to changes in the underlying market. One of the best ways to do this is to “feed” an indicator an artificially created dataset that focuses on specific types of market action. Think of this as a way to look at the indicator in a laboratory environment, isolating and controlling for various influences.

## **MOVING AVERAGES**

If you want to really understand the tools you are using and how they will react to extreme situations, it helps to understand how they will react in the most simple, basic contexts as well. Of course, everyone grasps the basics of moving averages: add higher prices and the average will go up. When price flattens out, the average eventually will flatten, too. When price turns down, it will cut through the moving average, and, at some point, it will start pulling the average down with it. This is all simple, but it is not the point. The point is to build an intuitive and intimate understanding of the behavior of the average as it responds to changing market data. One of the best ways I have found to foster this intuition with any technical tool is to generate simple price patterns in artificial price series, and then to plot the indicator on this synthetic price data. (Nearly all charting packages allow users to import ASCII data, but if this is not possible, the indicator may be calculated directly in an Excel spreadsheet and graphed there.) Think of this as a controlled laboratory experiment: you are controlling the data that is fed to the indicator so you can begin to understand the details of

the indicator's reactions to that data. This process, along with careful thought and reflection, will build an understanding that goes beyond a simple understanding of the patterns on the screen.

The charts that follow are examples of this process. There is value in these specific examples, but it is even more important that you can take the procedure and adapt it to your own use. These examples show both 20-period *simple moving averages (SMAs)* and *exponential moving averages (EMAs)* to compare their behavior and fluctuations. The formulas required to build these indicators are already available from many books or the Internet, so they will not be a focus in this chapter, but you must have a clear conceptual understanding of the behavioral differences between the two. The simple moving average simply averages the price over a look-back window. It is completely blind to any data outside of that window, which creates the first potential issue: a simple moving average moves *twice* in reaction to any single large event. The value of the moving average has a change both when the event occurs and when it passes out of the left side of the evaluation window.

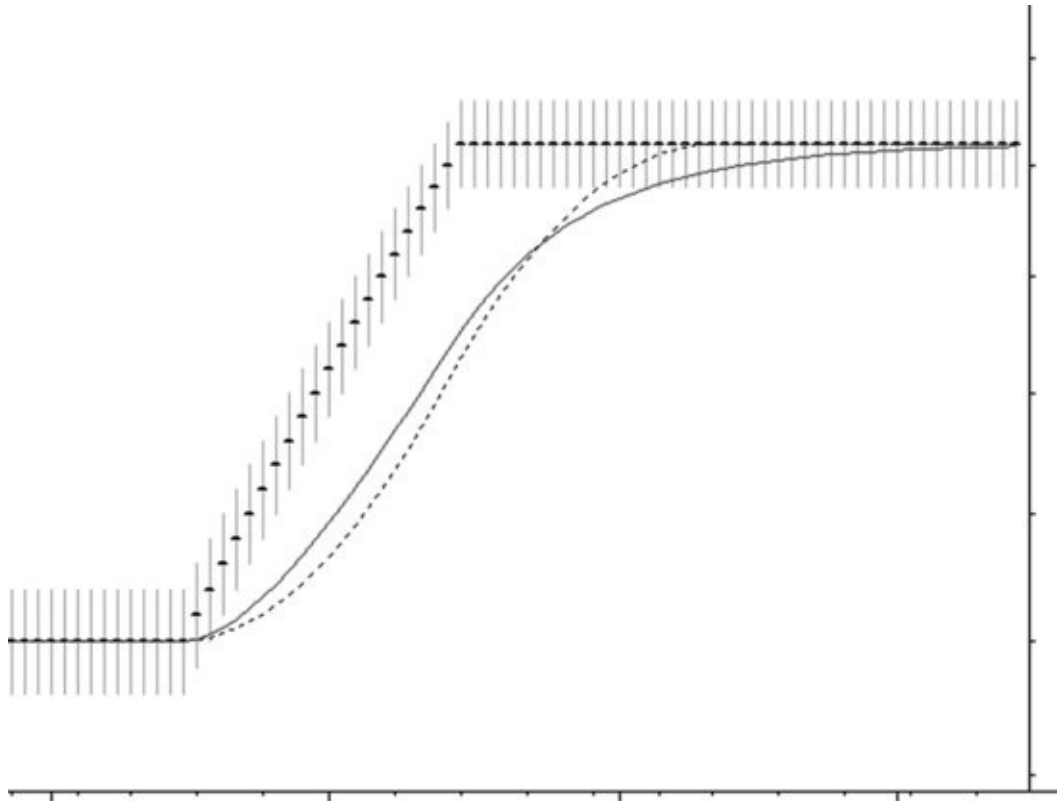
The EMA is a considerably more complex animal. Recent data are weighted more heavily in an EMA, and, technically, no data points are *ever* dropped from the average. Rather than being dropped, past data is rolled off with an exponential decay. In actual practice, the effect of distant past data far out of the evaluation period of the average is so small that it is insignificant, but it is still there. It is important to realize, though, that this effect smoothes the left-hand side of the evaluation window—an EMA will not jump twice as a simple moving average will. This is one of the main advantages of the EMA over the SMA.

## Comparing EMA and SMA Behavior

Consider first how the moving averages react to a sudden shock in the market. [Figure B.1](#) shows an artificial data series that is flat, then suddenly breaks into a precise linear trend, which just as abruptly comes to an end as prices flatten out again. Both the SMA (dotted line) and the EMA (solid line) are 20-period averages, but the front-weighting effect of the EMA causes it to react more quickly to the initial price shock. After a period of time, both averages settle into a steady relationship to the price trend, but the simple moving average is much quicker to return to the center after the trend stops. This effect is due to the decay in the EMA, which sees *all* data to the left of the average; the SMA is just

a simple average of the past 20 data points. Once the market has been flat for 20 bars, the simple moving average exactly equals the close. There are two important lessons here. Most traders know the first, but few know the second. For an SMA and an EMA of the same length:

**FIGURE B.1** Twenty-Period Simple (Dotted Line) and Exponential Moving Averages in a Market That Clearly Shifts from Trading Range to Trend and Back

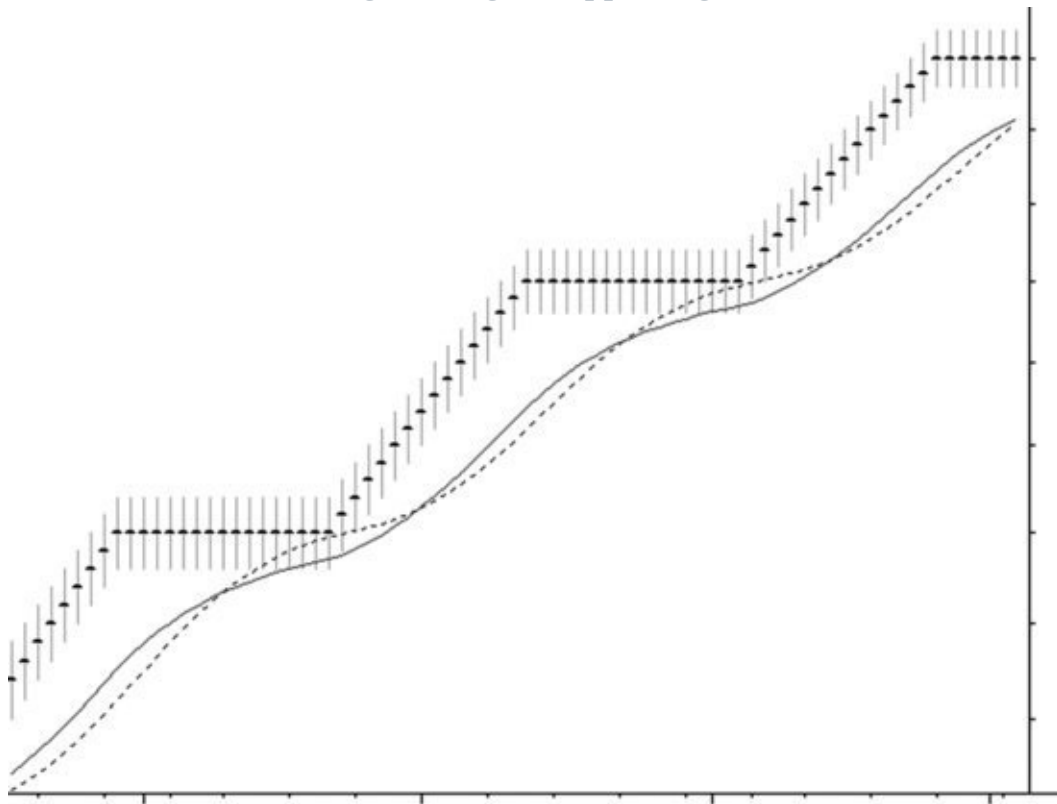


- The EMA will react faster to a large price change because it front-weights the data.
- However, the EMA is also slower to react to stabilizing prices because it has a very long look-back window.

Many traders are convinced that moving averages provide support and resistance. Chapter 16 investigates this claim in some depth, and shows that there is no proof that any moving average is any better than any random number. One reason that so many traders remain convinced of this support/resistance effect is because it looks so convincing on charts. It is easy to find example after example of places where price touched a moving average and then shot away, but this is a result of two effects: One, we tend to attach more significance to

lines on charts and to perceive patterns in random relationships. Two, there is a mathematical reason for this, as moving averages will approach prices as they pause in trends due to simple math. [Figure B.2](#) illustrates this effect in an idealized market moving in stair-step trend legs.

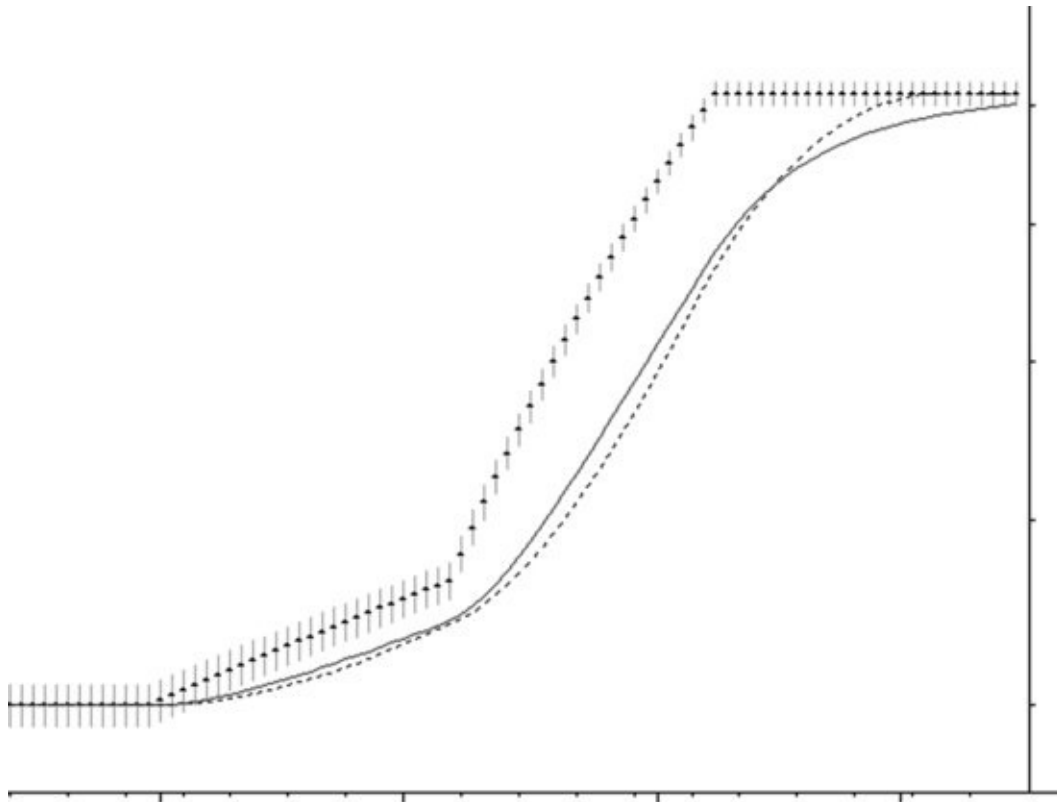
**[FIGURE B.2](#)** Are the Moving Averages Supporting Prices?



If the rate of a trend is constant (arithmetically, not geometrically), a moving average will eventually settle into a consistent visual relationship with that market, tracking it at the same rate below, for an uptrend, or above in the case of a downtrend. If the rate of the trend increases, or if there is a shock in the opposite direction, the EMA will react before the SMA, but, as before, the SMA will react more quickly to stabilizing prices. It is also not well known, but the EMA will approach price more closely than a SMA in a stable trend, again due to the front-weighting in the EMA calculation. Essentially, the EMA catches turns a bit faster, but is much slower to come into the new, stable value when the trend ends and transitions into a new trading range. This is expected behavior, as the EMA should respond quickly to recent data while maintaining a memory of the long data history. [Figure B.3](#) shows a trend with two inflection points and a clear ending point. Spend some time thinking about how the SMA and EMA

react differently at these inflections; if you are using the slope of a moving average, or a moving average crossover, to define trends, you need to be aware of these issues. One average is not better than the other, but you need to be mindful of the differences.

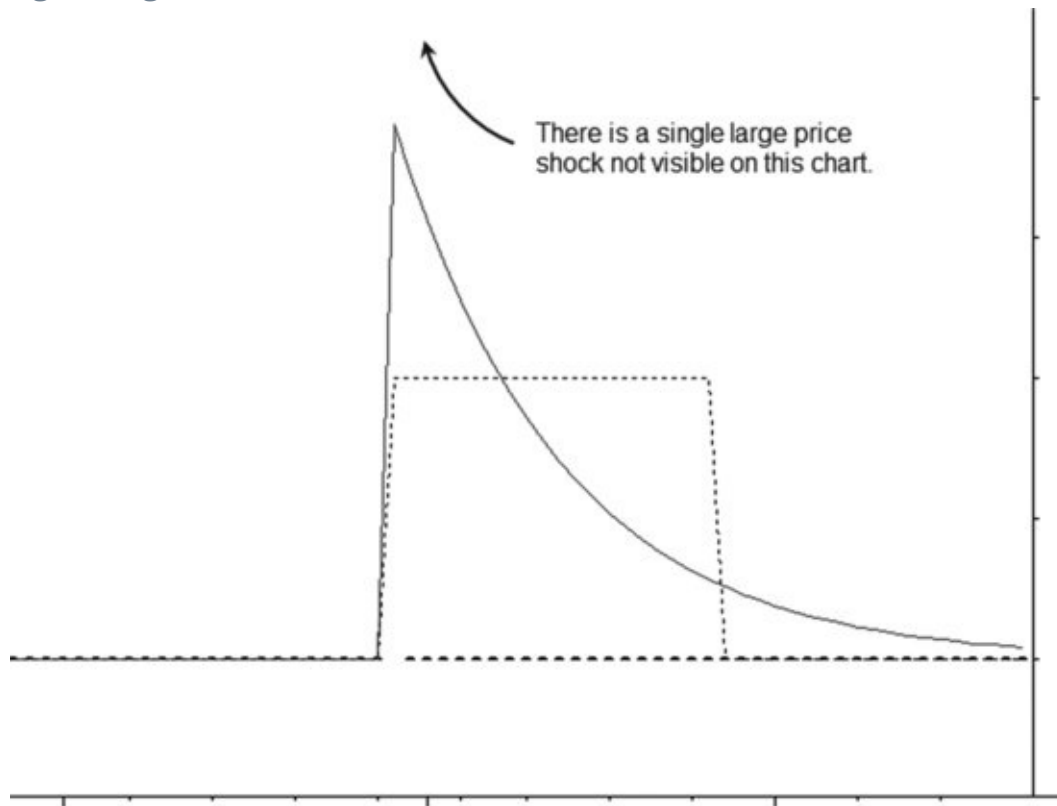
**FIGURE B.3** Notice the Different Behavior of the EMA and the SMA at Inflection Points and at the End of the Trend



[Figure B.4](#), which has a single price bar that is not visible far above the top of the chart, is useful for building intuition about how the averages react to a sudden shock. Note that the SMA shows *two* inflection points when there was actually only *one* event on the chart. The second inflection (the drop) in the SMA was merely an artifact created as the price spike moved out of the average's evaluation window. In this particular case, the EMA probably more accurately reflects what is going on in the market. Traders using an SMA in an intuitive fashion are not likely to be misled, because they are focusing on the bigger picture, but systematic approaches or tools (such as trend indicators) derived from an SMA may have some issues with outliers. Particularly in intraday data, where the overnight gap is significant, or longer-term equities, which have frequent price shocks due to earnings announcements, systematic

tools based on simple moving averages are subject to distortion.

**FIGURE B.4** Notice the Different Behavior of the EMA and SMA in Response to a Single Large Price Shock

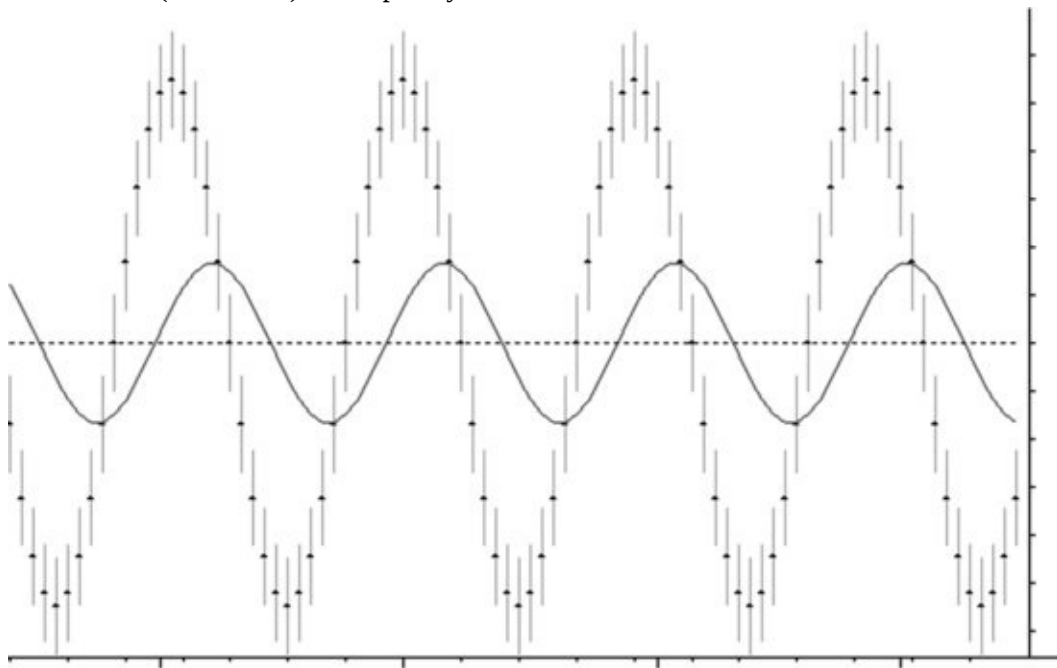


Few traders realize that simple moving averages are low-pass filters, meaning that they will filter out (eliminate) higher-frequency oscillations and cycles. [Figure B.5](#) shows a situation that will probably not be encountered in actual trading: a market that is moving in an idealized 20-period sine wave, with 20-period SMA and EMA applied. Though it may be very counterintuitive, the SMA is completely flat. When the SMA length matches the sine wavelength, there are always as many values above as below the moving average, so the average nets to zero—an SMA will always hide any cycles that are whole-number multiples of the SMA length. You might think that this is pure theory and that it would not have any application to a real trading situation, but extraordinary situations do occur. I once had a trader I was working with point out that his moving average on a 1-minute chart was not “working right” on part of the chart because it was not reacting to the market’s movements. For about 45 minutes, this stock had settled into a very dependable cycle that just happened to match the length of the moving average he was using, so, while the market was

oscillating fairly wildly, his average wouldn't budge. There are cycles in the market. It is difficult to trade them because they are ephemeral and they shift frequently, but they will sometimes line up with your moving averages with seemingly bizarre results. Trade long enough and you will see pretty much everything.

**FIGURE B.5** Twenty-Period EMA and SMA Applied to a Theoretical 20-Period Sine Wave

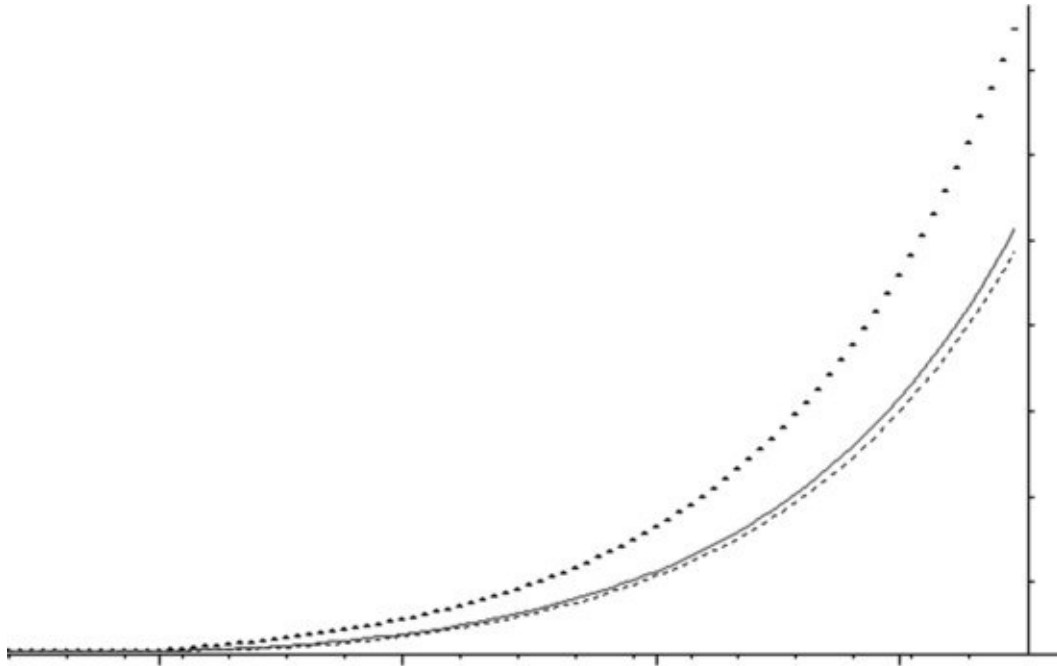
Notice that the SMA (dotted line) is completely flat on the zero line.



Let's end this section with an example that is important for longer-term investors to keep in mind. The natural language of the market is percentage changes and growth rates, which is why finance math is based on discounting cash flows and compound interest, and why the first task of any research project is converting prices into returns. Shorter-term traders tend to think in differences (e.g., "I made a point and a half in that stock."); longer-term investors think more often in percentages. [Figure B.6](#) shows a market that is growing at a constant rate; each data point is a 5 percent increase over the previous one. On a linearly scaled chart, a market appreciating at a constant growth rate will describe a *curve*, not a straight line. On a linear chart, moving averages will seem to lag behind the price curve at an ever-increasing distance.

**FIGURE B.6** Moving Averages Applied to a Market Growing at 5 Percent Constant Rate, Linear Scale

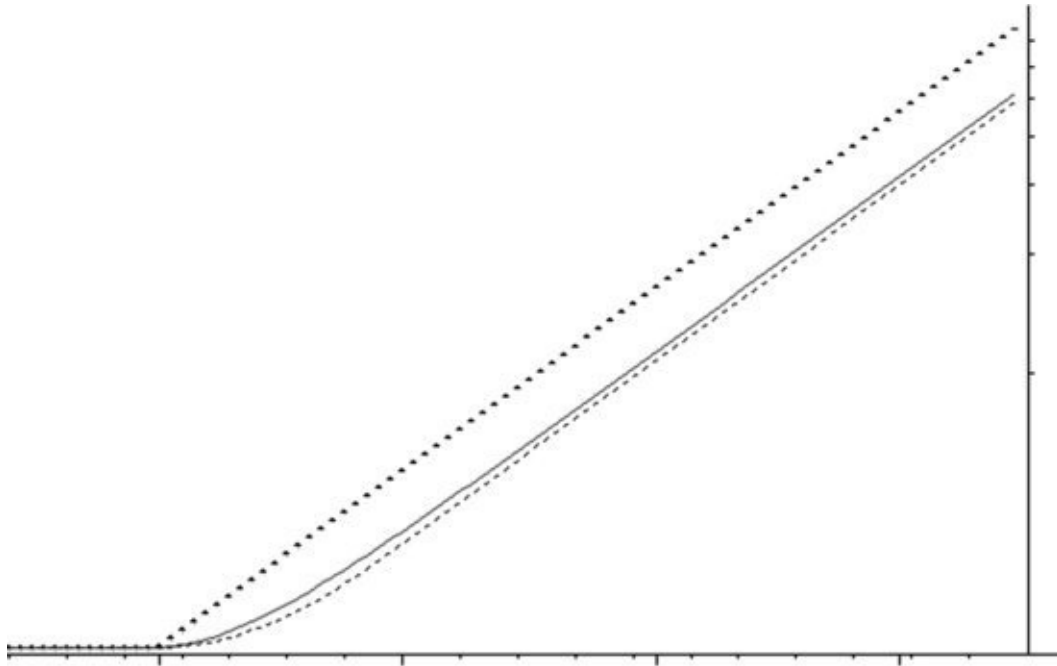




What is actually happening, however, is that the moving averages lag a *constant percentage* behind prices. The linear chart does not misrepresent anything, but it is not the right tool to look at percentage-based relationships. [Figure B.7](#) is exactly the same as the previous chart; the only difference is that the y-axis is log scale rather than linear. Remember, log scale charts are designed so that equal distance intervals on the y-axis are equal percentage changes, not equal price changes as on a linear chart. Note the ticks on the right side of the y-axis, which are evenly spaced prices on the linear chart, become compressed near the top of the axis when log scaled. Be clear on this effect: straight lines on log charts are curves on linear charts. If you are drawing trend lines on log scale charts, you are actually drawing curves on normal, linearly scaled charts. This may be perfectly correct in the context of a longer-term chart where the curve faithfully represents the growth rate, but it is something that must be fully understood.

**FIGURE B.7** Moving Averages Applied to a Market Growing at a Constant 5 Percent Rate, Log Scale

Note that curves on previous chart are straight lines here.



## THE MACD

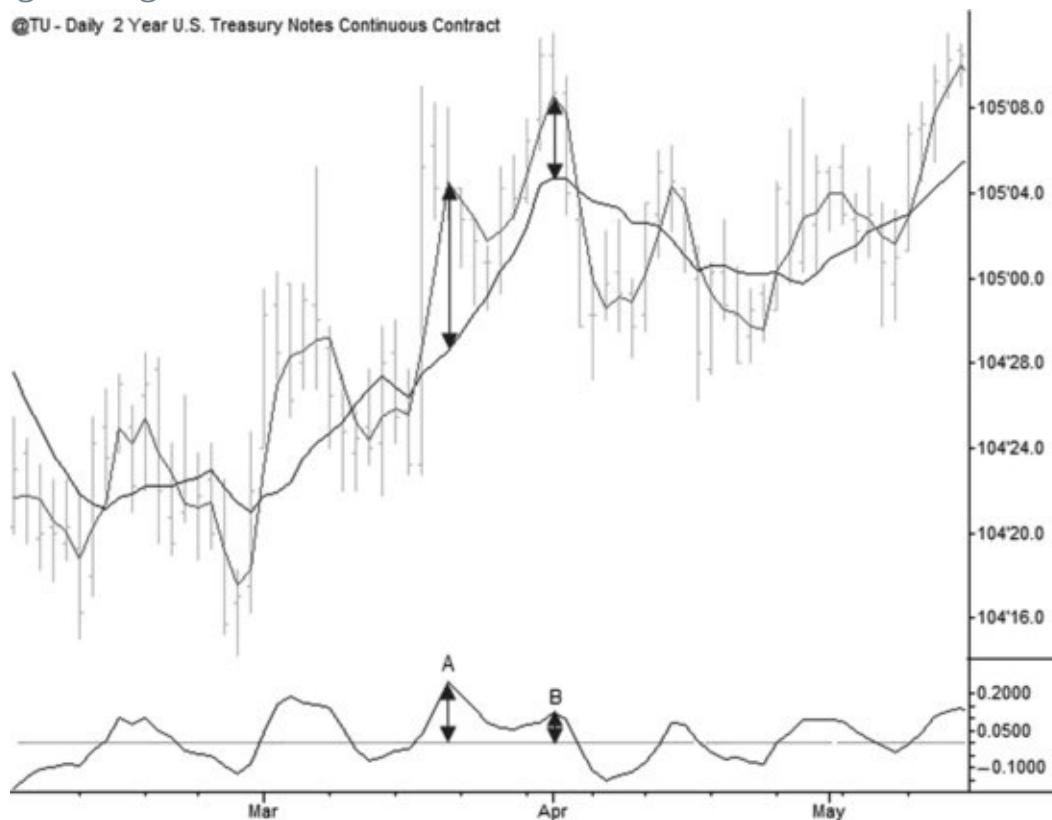
Moving average convergence/divergence (MACD) was one of the early technical tools developed by Gerald Appel in the mid-1970s. As an interesting aside, this is one of the few commonly used indicators whose name actually says something accurate about the tool. Consider some other indicators: stochastics have nothing at all to do with stochastic processes; the Relative Strength Index (RSI) neither measures relative strength nor is it an index; the Commodity Channel Index (CCI) is not commodity-specific, nor does it deal with channels, nor is it an index. This is not an exhaustive list, but you get the idea. The standard MACD consists of four elements: a fast line (the MACD proper), a slow line (the signal line), a zero line for reference, and a histogram (bar chart) that shows the difference between the slow and fast lines. The standard MACD is constructed from exponential moving averages, but this modified version uses simple moving averages and dispenses with the MACD histogram altogether, resulting in a cleaner indicator.

### Basic Construction of the MACD

The fast line of the MACD measures the distance between a shorter-term and a longer-term moving average. To understand exactly what this measure says about price action, think about how different periods of moving averages will

respond to price movement. A moving average with a short look-back window (period) will track price movements more closely than an average with a longer period. [Figure B.8](#) shows 3-period and 10-period simple moving averages applied to a daily chart of two-year Treasury notes. The line plotted below the price bars is the fast line of the MACD, which is simply the value of the slow moving average subtracted from the value of the fast average. When the fast average is above the slow average, this line is positive and vice versa. Notice the important behavior at the points marked A and B on this chart. Though price was higher at B, the distance between the moving averages was actually smaller, so the indicator registers a lower level at B. The distance between these two averages is one way to measure the momentum behind a market's movements, and this lower peak in the indicator suggests that the second price high was made on lower momentum.

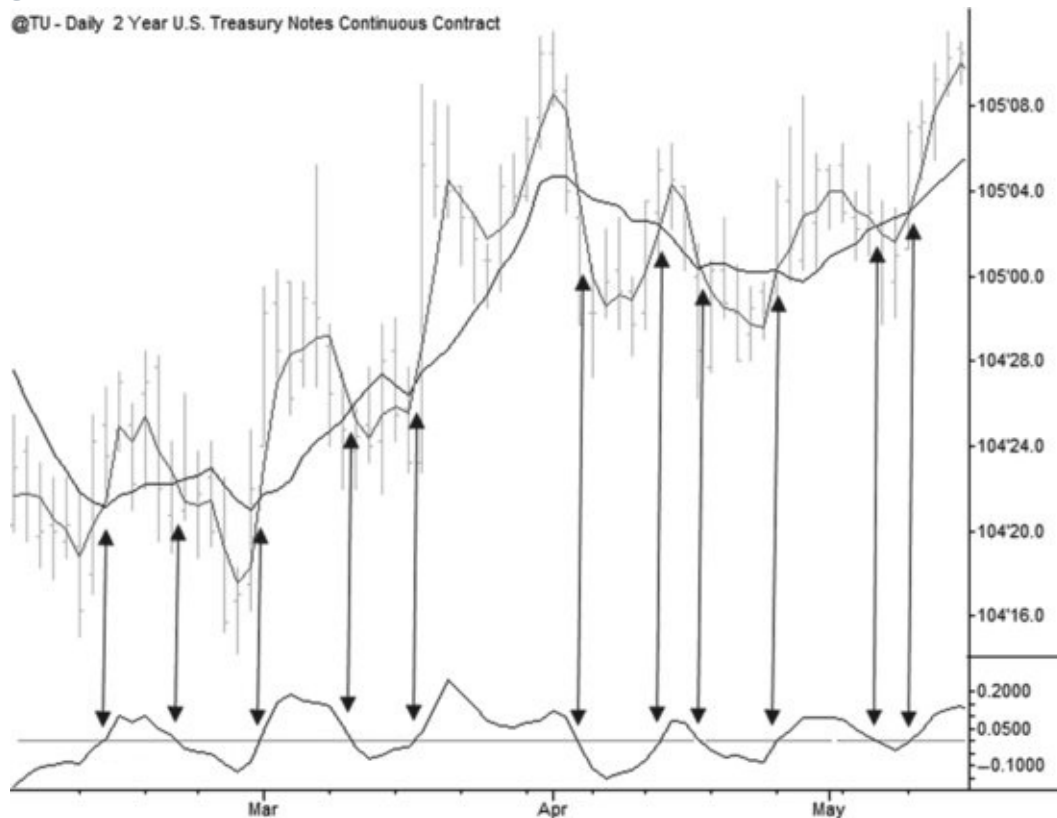
**FIGURE B.8** The Fast Line of the MACD Measures the Distance Between Two Moving Averages



Another important point is that the fast line of the MACD will register zero when the two averages cross; this highlights a condition of relative equilibrium on the time frame being measured. [Figure B.9](#) marks spots where the fast line

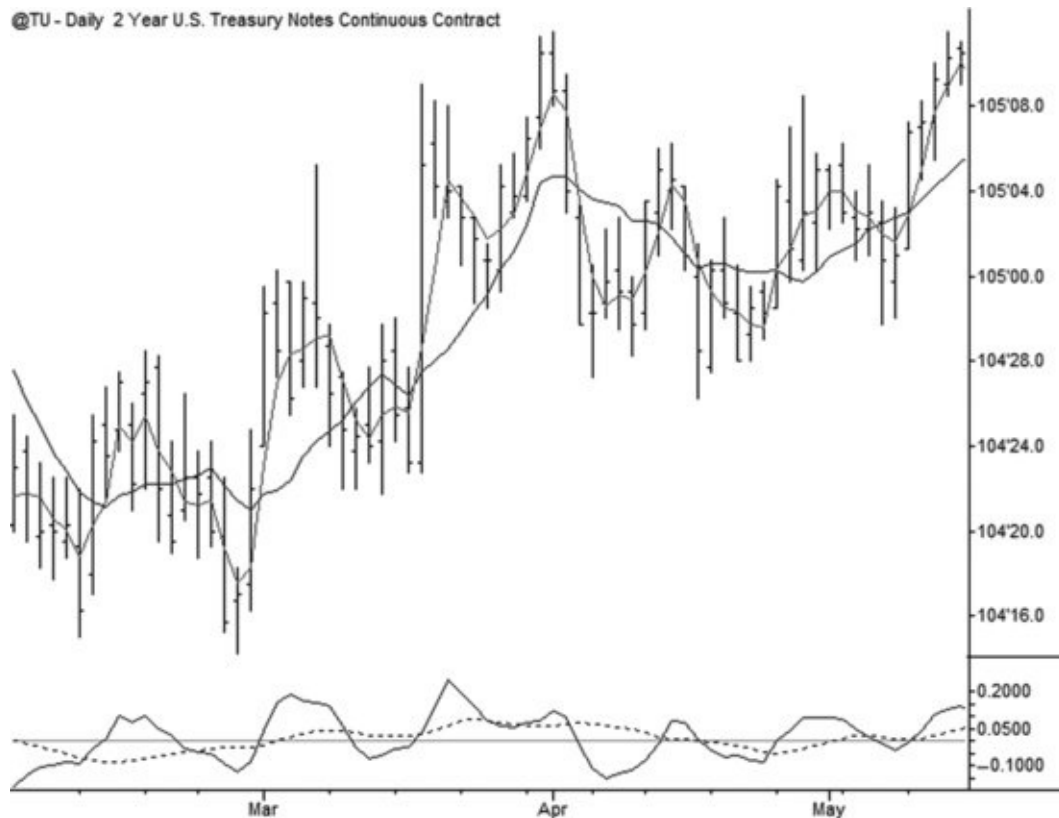
crosses the zero line, and shows that this happens when the moving averages intersect.

**FIGURE B.9** The Fast Line of the MACD Crosses Zero When the Moving Averages Touch



**Figure B.10** shows the slow line (sometimes called the signal line) of the MACD, which is simply a 16-period moving average of the fast line. It is important to note that, being a smoothed version of the fast line, it lags the fast line considerably, but also generally reflects the trend of the fast line—if the fast line is far above zero, the slow line will usually be sloping upward and vice versa. There are several ways to use the slow line, but the general concept tying them all together is that it reflects the trend on an intermediate-term time frame.

**FIGURE B.10** The Slow Line of the MACD Is a Smoothed Version of the Fast Line

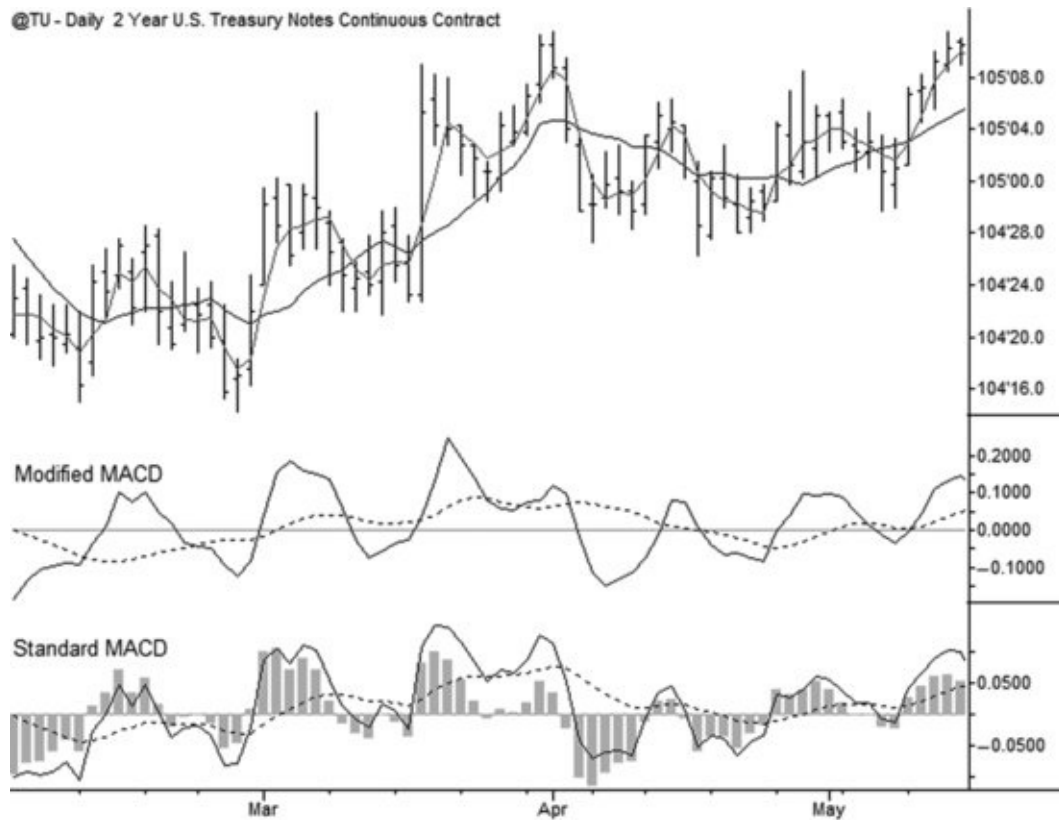


This is the construction of the particular variation of the MACD that I use. For each bar, calculate:

- Fast line: 3-period SMA minus 10-period SMA.
- Signal line: 16-period SMA of the fast line.
- Histogram: none.
- Plot a zero line for reference.

Using the same (3, 10, 16) settings in a standard MACD will give similar results, but, in my experience, the long memory of the exponential moving averages (EMAs) does make a difference at times. You will certainly be able to apply the same concepts to the standard MACD, but make sure you understand the differences between the two indicators. [Figure B.11](#) compares the modified with the standard MACD (3, 10, 16). Notice that the standard tool adds another plot, usually plotted as bars behind the indicator. This plot, the MACD histogram, shows the difference between the fast and slow lines of the MACD histogram, so it is actually the MACD of the MACD. Some traders find this to be a useful component, but it is possible to extract much of the same information from a careful reading of the fast and slow lines themselves.

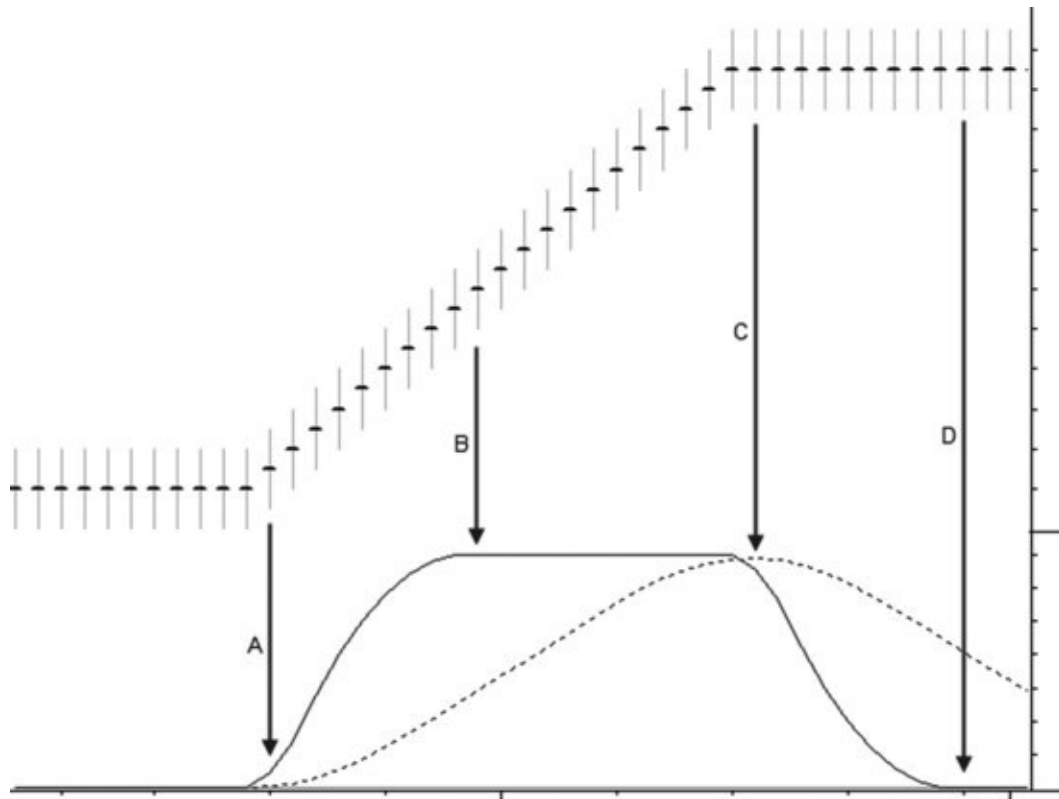
**FIGURE B.11** Modified and Standard MACDs (Both 3, 10, 16) Compared



## A Deeper Look

The fast line is very sensitive to changes in the rate of change of prices. Read that again, carefully: the fast line swings up in response to the second derivative, or the rate of change of the rate of change of price. When we actually work with this tool, we usually think of it a little more loosely, as simply measuring the momentum of prices, but it is a good idea to be as precise as possible here at the beginning—this tool measures *changes* in momentum, not momentum itself. To begin to build some intuition about this tool, [Figure B.12](#) shows a modified MACD applied to an idealized price series that breaks into a steady-state uptrend and then cleanly transitions to a sideways market. Consider the inflections in the MACD:

**FIGURE B.12** Note That Inflections in the Fast Line of the MACD Include Some Artifacts Due to the Indicator's Construction

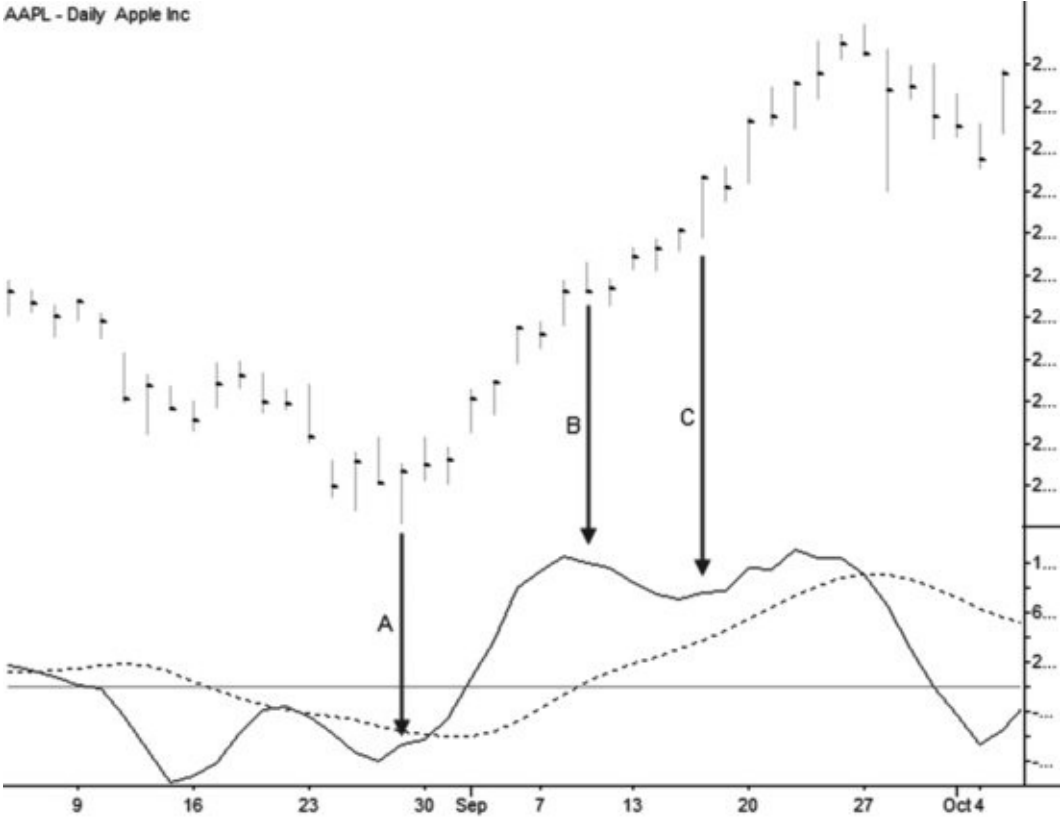


- A: The fast line responds immediately to the change in the market by hooking higher on the first price bar of the uptrend.
- B: Everything between points A and B is an artifact of the indicator. Though the slope of the fast line changes in a curve, this does not reflect any change in the rate of trend in the market, which is trending steadily higher. At B, 10 bars into the uptrend, the 10-period moving average is now trending steadily with prices (remember, the fast line measures the difference between a 3-period and a 10-period moving average), so the indicator goes flat.
- C: The fast line again responds immediately to the shift in the market by hooking down on the first bar that breaks the trend pattern. Note that the MACD fast line going down does not mean that prices are going down, but that the rate of change of prices has gone down, in this case to zero.
- D: The fast line levels out, again 10 bars following the change in the market.

If you are looking at [Figure B.12](#) and thinking that this could never be relevant in actual trading, consider the daily chart of Apple Inc. in [Figure B.13](#). After a downtrend, the market transitioned to an uptrend at the point marked A, and the MACD fast line immediately responded by hooking upward, just as in the inflection marked A in the previous chart. Real market action, of course, contains much more noise and variation than our simplified example, but much

of the downturn in the line at point B in [Figure B.13](#) is due to this 10-bar artifact. A trader paying too much attention to the indicator's line at this point might surmise that momentum had turned downward. Prices did take a small pause at this point, but the indicator's reaction was out of proportion to that change. Point C is also interesting; a large move up is required to hook the fast line up after an extended trend. Half of the battle with using indicators is knowing when to use them and when to ignore them. If you are reacting to every jot of the indicator, you are missing the point. It is much better to use the tool only at potential inflections to add another layer of confidence to analysis that focuses primarily on the price bars themselves.

**FIGURE B.13** Consider the Inflections of the MACD Applied to an Actual Market

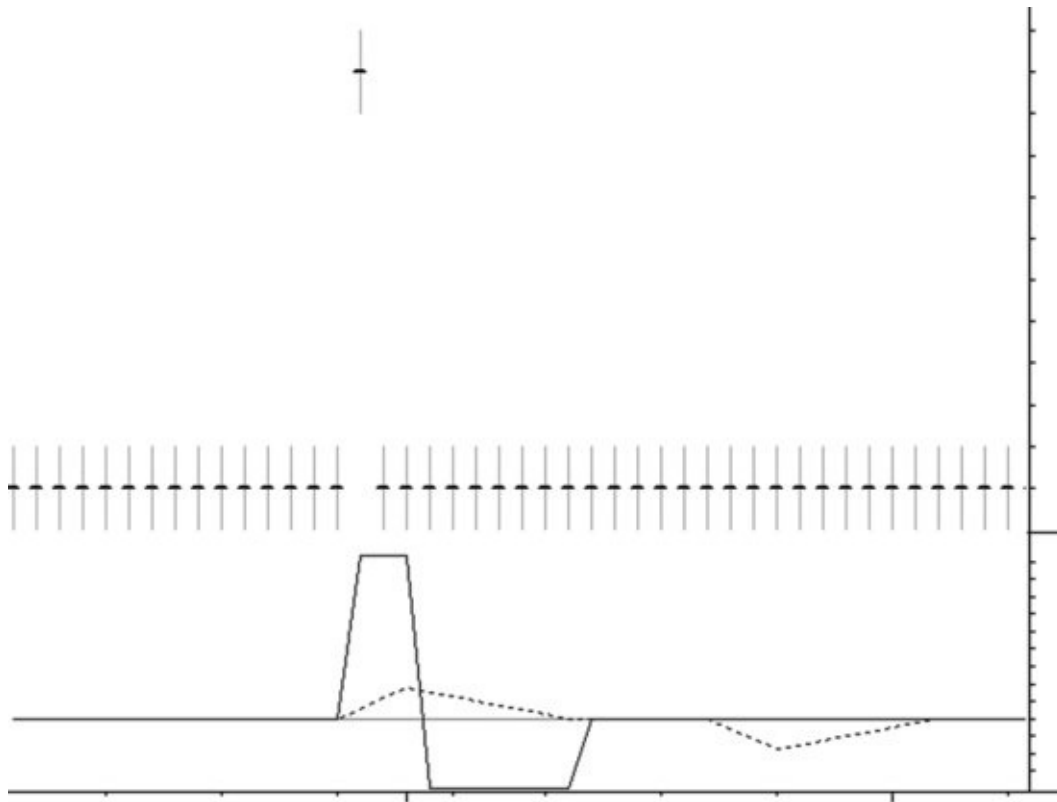


The modified MACD is constructed from simple moving averages, so it suffers from the problem of dual inflections to single price shocks. In fact, the multiple moving averages result in a complex reaction to single large events. This is rarely a significant problem when we are actually using the tool, but it can be an issue in some situations—for instance, in applying the tool to intraday data following a large overnight gap. [Figure B.14](#) shows a situation that would



be absurd in a real market: an otherwise absolutely flat market with a single large price shock, immediately reversed the following day. Note that the MACD's two lines have 12 inflections in response to this single bar! Again, this is not a tradable feature, but it does highlight the folly of trying to follow every move of the indicator too closely. In a real market situation, the indicator is nearly always irrelevant after a large price shock, and attention should be focused on other factors such as price action following the movement.

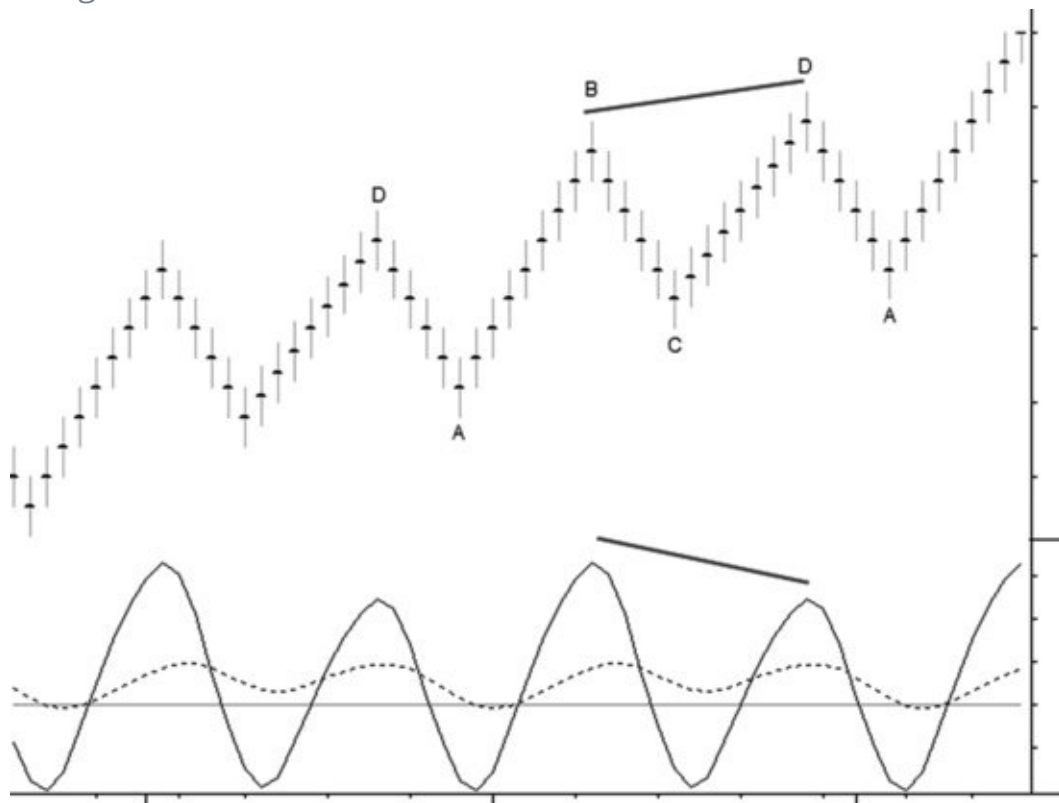
**FIGURE B.14** Multiple Inflections on the MACD Following a Single Price Shock



So far, these theoretical data sets have been so clean that it may be difficult to relate them to situations that are likely to occur in actual trading. Consider next what happens when the MACD is applied to a data set that begins to more closely approximate real market conditions, as in [Figure B.15](#). This data set alternates uptrending and downtrending legs, though it reduces them to consistent, idealized linear changes. Specifically, the down legs (BC and DA) are the same rate and length, while the up leg CD moves at a rate equal to 75 percent of AB's changes. The indicator registers a lower peak at D compared to B, which would suggest to many traders that trend leg CD, though it made a new

high relative to the point B, did so on lower momentum; this is an example of a so-called *momentum divergence* on the MACD. This example shows precisely what lower momentum means for the MACD: here it means that the lower-momentum leg had smaller daily changes compared to the higher-momentum leg. Note that, in this case, both legs were the same length in terms of number of bars, so the lower-momentum leg, overall, covered a smaller range of prices than the higher-momentum leg. If the lower-momentum leg had continued for more days it would eventually have moved the same distance as the higher-momentum leg, but it still would have shown a divergence with the indicator at the second peak.

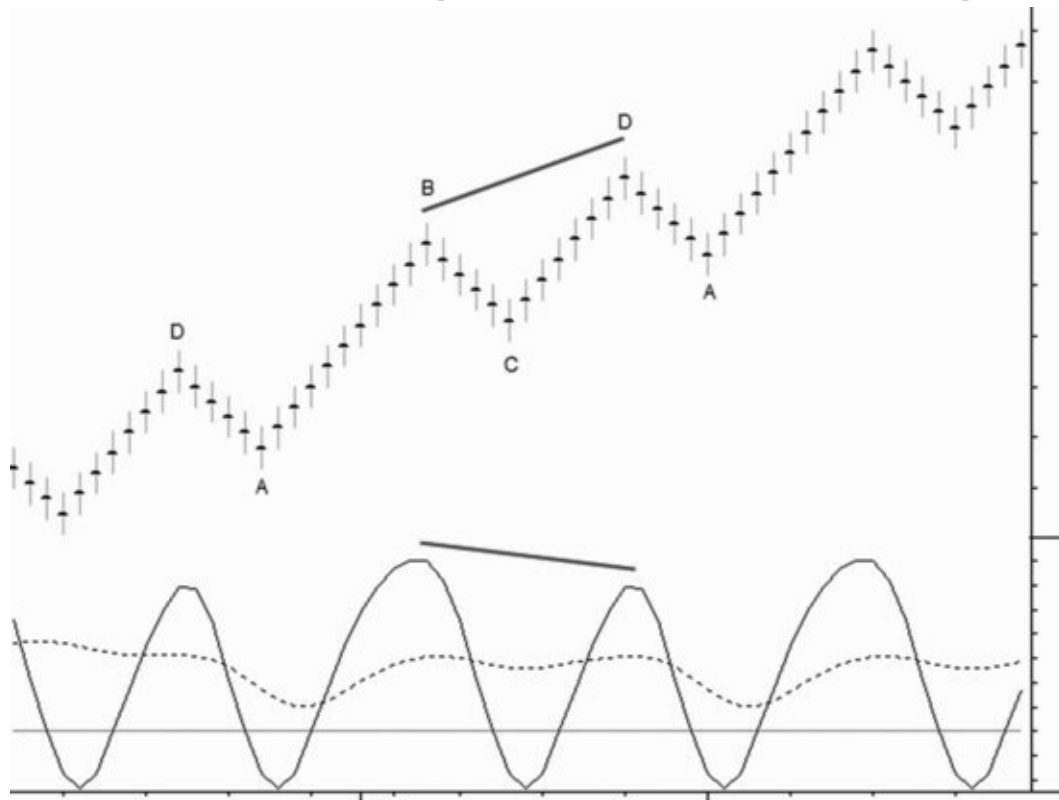
**FIGURE B.15** Momentum Divergence Due to Lower Rate of Change on the Second Leg



There is, however, another possibility, shown in [Figure B.16](#), which has two uptrending legs (AB and CD) that both move with the same rate of change. Here, the second leg (CD) is shorter, including fewer bars than the longer leg, and the indicator again registers a divergence. This is fundamental to divergence on momentum indicators: divergences will register with trend legs that either move at a lower rate of change or extend for fewer bars relative to the higher-

momentum leg. In actual practice, the presence of additional noise and fluctuation obscures these simple tendencies, but this is the underlying truth of momentum divergence. Very few traders think about these concepts with precision.

**FIGURE B.16** Momentum Divergence Due to a Shorter Second Leg



# APPENDIX C

## Sample Trade Data

This table contains the trade data for the “Statistical Analysis of Trading Results” section in Chapter 13. These data, and the data for the control chart analysis in that same chapter, are available from the author’s web site at [www.adamhgrimes.com/](http://www.adamhgrimes.com/) in CSV format.

Trade ID	System	Position Value	Initial Risk	Account Net Liq	Net P&L	P&L as %R	P&L as % Position Val	Pro Forma P&L
1	A	17,320	(1,260)	100,000	1,228	1.0X	7.1%	975
2	C	11,245	(1,655)	100,000	335	0.2X	3.0%	202
3	A	8,210	(1,790)	100,000	972	0.5X	11.8%	543
4	A	13,984	(736)	100,000	48	0.1X	0.3%	65
5	C	13,984	(736)	100,000	88	0.1X	0.6%	120
6	C	4,610	(390)	100,000	405	1.0X	8.8%	1,038
7	C	9,220	(780)	100,000	350	0.4X	3.8%	449
8	A	18,634	(1,154)	100,587	(5)	-0.0X	(0.0%)	(4)
9	C	53,563	(1,538)	100,829	(1,056)	-0.7X	(2.0%)	(693)
10	A	9,292	(1,068)	100,000	(400)	-0.4X	(4.3%)	(375)
11	D	18,189	(941)	100,000	(486)	-0.5X	(2.7%)	(517)
12	B	32,048	(884)	104,137	(80)	-0.1X	(0.2%)	(94)
13	B	26,959	(641)	103,406	878	1.4X	3.3%	1,417
14	C	26,959	(641)	103,406	694	1.1X	2.6%	1,120
15	B	16,250	(1,150)	102,016	(114)	-0.1X	(0.7%)	(101)
16	A	32,258	(1,018)	103,072	(198)	-0.2X	(0.6%)	(200)
17	A	14,091	(1,059)	102,706	(849)	-0.8X	(6.0%)	(823)
18	A	11,173	(511)	102,706	99	0.2X	0.9%	198
19	A	5,587	(255)	102,706	255	1.0X	4.6%	1,027
20	C	5,587	(255)	102,706	179	0.7X	3.2%	721
21	B	8,830	(1,008)	102,588	(676)	-0.7X	(7.7%)	(688)

Trade ID	System	Position Value	Initial Risk	Account Net Liq	Net P&L	P&L as %R	P&L as % Position Val	Pro Forma P&L
22	A	7,200	(850)	103,215	(120)	-0.1X	(1.7%)	(146)
23	A	17,888	(938)	103,215	15	0.0X	0.1%	17
24	B	5,242	(282)	103,215	240	0.9X	4.6%	878
25	B	5,242	(282)	103,215	152	0.5X	2.9%	556
26	C	5,242	(282)	103,215	282	1.0X	5.4%	1,032
27	A	35,552	(1,552)	100,605	(196)	-0.1X	(0.6%)	(127)
28	C	8,404	(1,196)	104,007	66	0.1X	0.8%	57
29	A	32,556	(956)	103,644	(284)	-0.3X	(0.9%)	(308)
30	A	25,103	(848)	103,162	(68)	-0.1X	(0.3%)	(82)
31	B	8,425	(225)	103,162	315	1.4X	3.7%	1,444
32	C	37,818	(1,602)	103,389	(1,242)	-0.8X	(3.3%)	(802)
33	C	14,340	(1,620)	102,812	(1,285)	-0.8X	(9.0%)	(816)
34	A	8,248	(243)	98,902	433	1.8X	5.2%	1,764
35	A	24,743	(728)	98,902	510	0.7X	2.1%	693
36	D	33,370	(1,350)	98,902	(480)	-0.4X	(1.4%)	(352)
37	A	54,095	(1,083)	99,862	(989)	-0.9X	(1.8%)	(912)
38	A	64,135	(865)	99,862	(705)	-0.8X	(1.1%)	(814)
39	A	29,880	(1,480)	99,862	(890)	-0.6X	(3.0%)	(601)
40	A	76,153	(1,247)	99,845	(581)	-0.5X	(0.8%)	(465)
41	A	63,936	(1,344)	98,076	(1,096)	-0.8X	(1.7%)	(800)
42	A	42,655	(845)	97,992	(425)	-0.5X	(1.0%)	(493)
43	D	29,970	(1,770)	97,992	(458)	-0.3X	(1.5%)	(253)
44	A	129,240	(1,470)	98,839	135	0.1X	0.1%	91
45	B	36,449	(1,505)	100,979	(645)	-0.4X	(1.8%)	(433)
46	A	4,801	(199)	98,238	298	1.5X	6.2%	1,471
47	A	9,602	(398)	98,238	768	1.9X	8.0%	1,896
48	B	9,602	(398)	98,238	398	1.0X	4.1%	982
49	B	9,602	(398)	98,238	802	2.0X	8.4%	1,980
50	D	53,445	(1,534)	97,640	(41)	-0.0X	(0.1%)	(26)
51	B	25,659	(466)	96,863	466	1.0X	1.8%	969
52	D	51,319	(931)	97,329	269	0.3X	0.5%	281
53	A	17,325	(666)	96,863	390	0.6X	2.3%	567
54	C	8,663	(333)	96,863	210	0.6X	2.4%	611
55	D	17,325	(666)	96,863	668	1.0X	3.9%	971
56	B	18,826	(539)	96,863	1,094	2.0X	5.8%	1,966
57	B	18,826	(539)	96,863	1,078	2.0X	5.7%	1,937
58	C	18,826	(539)	96,863	538	1.0X	2.9%	967
59	C	27,310	(650)	96,863	650	1.0X	2.4%	969
60	C	27,310	(650)	96,863	425	0.7X	1.6%	633
61	B	8,060	(470)	100,213	500	1.1X	6.2%	1,066
62	B	8,060	(470)	100,213	473	1.0X	5.9%	1,007
63	C	8,060	(470)	100,213	470	1.0X	5.8%	1,002
64	B	29,383	(1,547)	104,570	(57)	-0.0X	(0.2%)	(39)
65	A	16,676	(1,004)	102,317	772	0.8X	4.6%	787
66	B	8,338	(502)	102,317	286	0.6X	3.4%	583
67	A	63,520	(1,280)	102,484	(736)	-0.6X	(1.2%)	(589)
68	A	76,263	(1,662)	103,257	(912)	-0.5X	(1.2%)	(567)

# Glossary

**acceleration factor** In the Parabolic SAR, an input that controls how quickly the stop and reverse level is moved toward price. Normally, this factor increases with each bar, moving the stop closer at an ever-accelerating rate.

**accumulation** One of the classic market phases in which large buyers establish positions without moving the market, but also can refer to the presence of underlying buying in other contexts. Accumulation is usually seen as constructive and supportive of prices.

**adaptive markets hypothesis (AMH)** A theory of market behavior pioneered by Andrew Lo that proposes that markets can be described by a process of evolving efficiency.

**always-in** A colloquialism for styles of trading that seek to always have a position in the market, reversing from long to short based on technical signals. Perhaps more useful as a research/backtesting methodology than an actual trading style.

**Anti** A trade setup that attempts to enter the first pullback following a potential change of trend.

**ask** Also called the offer. The price, almost always above the bid and often above the last print, in an order book at which people are willing to sell the market.

**asynchronous trading** A problem in evaluating indexes, pairs trades, or some systems in which prices that occur together in the data series may not have actually occurred at the same time.

**ATR%** Average True Range (ATR) as a percentage of the last price, or ATR standardized for price. This is a volatility measure that can be compared across assets with different price levels.

**autocorrelation** The correlation of a time series to itself at different time points, as a function of the time between them. Autocorrelation can often cause trends in price series.

**Average Directional Index (ADX)/Directional Movement Index (DMI)** Technical indicators that measure strength of trend.

**average range** A simple volatility measure that averages the range of a set of bars. In practice, Average True Range (ATR) is more commonly used to capture overnight gaps, but average range may be more applicable in some intraday applications.

**Average True Range (ATR)** A measure of volatility. True range is the bar's range (high minus low) plus any overnight gap from the previous bar's close.

**backtesting** Applying a rule set to historical prices to see how it would have performed in terms of returns, volatility, and stability. This is a complex and involved process; many traders who attempt it make some critical errors.

**basis point** One hundredth of a percent. 1 basis point (bp) = 0.01 percent.

**bell curve** An informal term for the shape of the normal distribution curve.

**bid** In financial markets, the price, often below the last price and always below the offer, where buyers are willing to purchase the asset.

**binomial tree** A useful tool in understanding random walks. A visual representation of the possible values a random walk or asset price could take at various steps in time.

**black boxes** A term usually reserved for completely computerized and rule-based trading systems.

**breakout trades** A class of trades that seeks to enter on moves above

resistance or below support, looking for continuation in the direction of the break. Equity-centric traders are more likely to use the term *breakdown* for a move below support; futures traders tend to use *breakout* for both trades.

**candlestick chart** A type of chart that pictures the space between the open and the close of a period as an empty or full rectangle, depending on whether the close was higher or lower than the open, with thin “shadows” extending to the high and low of the period.

**capital asset pricing model (CAPM)** A model to determine the theoretical price of an asset as a function of the risk-free rate and market return. CAPM was an important step in the evolution of academic thinking about markets, but has little, if any, utility in actual practice.

**causation** In financial markets, it is very difficult to determine causative links between markets and exogenous factors. Classically, researchers in other fields try to isolate potential causative factors to understand their influence, but this is difficult to do in market settings. It is important to avoid assumptions and to learn to think carefully about this important issue.

**central limit theorem** A theorem that informally states that the outcome of many random events will tend to follow the normal distribution. For instance, if a set of dice is rolled many times and the rolls recorded, the data set will eventually approximate the normal distribution. The central limit theorem is very important to many statistical tests.

**central tendency** The term that describes how values in a probability distribution tend to cluster around one or more values. Mean, median, and mode are common measures of central tendency.

**chandelier stop** A trailing stop technique that hangs a stop a certain distance under the highest point the market has reached since the position was initiated. (The technique is mirrored to the downside.)



Many variations are possible.

**climax** Usually refers to a move near the end of an extended trend in which the trend accelerates into a steeper move, usually accompanied by an increase in volume. Climaxes on higher time frames can mark major inflection points in markets, but smaller climaxes are common on lower time frames. One of the central problems of technical analysis is discerning climax from strength (or weakness, in the case of a downside climax).

**close** Many financial markets report official closing prices at the end of the session. These are usually not simply the last price traded (though they may be in some markets), but are set through several different methods. This price is important to traders because daily P&Ls are marked to this price. Also, many traders will use close to refer to the last price of any time interval (e.g., “the close of this current 5-minute bar or candle”).

**coefficient of variation** Obtained by dividing the standard deviation by the mean—conceptually this is similar to the reciprocal of the Sharpe ratio with the risk-free rate set to zero. While not a meaningful measure by itself, it is useful when comparing different trading techniques, systems, or patterns, as it shows how much variability is being assumed per unit of return.

**complex pullback** A two-legged pullback that is a complete ABCD trend structure. These are common, especially in mature trends.

**compound loss** Compound gains or losses take into account the compounding effect of interest. For instance, two consecutive 10 percent losses do not total a 20 percent loss, because the second was made on a smaller capital base.

**conditional probability** If  $\text{Prob}(A)$  is the probability of event A occurring, then  $\text{Prob}(A|B)$  is read as “the probability of A occurring, given that B has occurred.” Conditional probability is one of the techniques used to ascertain independence in trading systems and

market patterns. Many traders make errors in thinking about probabilities because they do not understand this important subject.

**cone of uncertainty** A term that describes the future distribution of asset prices for a given level of volatility. Useful in a theoretical sense to visualize some specific problems relating to uncertainty, but most applications assume that the normal distribution holds. Since it almost never does in financial markets, there is limited practical utility for this tool.

**confluence** Some methodologies assume that support and resistance levels are more meaningful if levels from several different time frames line up at a specific price. This lining-up of levels is called confluence.

**consolidated tape** A high-speed system that electronically reports the last price and volume data on sales of exchange-listed equities.

**consolidation** A general term to describe a condition in which markets are not trending. In general, consolidation areas are seen as resting points in a trend, usually leading to continuation in the direction of the original trend. For practical purposes, pullbacks, flags, and consolidations are equivalent terms.

**day trade** A trade entered and exited on the same day and not held overnight.

**demand line** Richard Wyckoff's term for uptrend lines drawn below prices that show where buyers' demand has been sufficient to stop the downward movements of prices.

**dependent variable** In regression analysis, the variable whose values are assumed to change in response to the other variable(s).

**disaster risks** A term used to refer to risks from nearly completely unforeseeable events such as fire, flood, or a large-scale failure of the exchange network. These risks are extremely rare, could have catastrophic consequences, and are very difficult to hedge.

**discretionary trading** A style of trading that allows varying degrees of human input in trading decisions.

**distribution** The opposite of accumulation; traditionally, a price area where holders of an asset are seen to be selling their inventory carefully, so as to avoid causing prices to break down. In practice, often taken as a sign of impending price weakness.

**drawdown** In trading system design or application, the amount lost from the high-water mark for the system/account. This is an underutilized measure of risk.

**economically significant** Statistical significance is a reasonably well-understood subject, but there can be patterns that are statistically significant without being economically significant. For instance, perhaps a pattern shows a very consistent edge, but it would be impossible to capture that edge because it is smaller than transaction costs. It is often difficult to truly evaluate economic significance because costs will vary from firm to firm and from trader to trader—what might not be economically significant to one trader could be a steady income for another.

**Efficiency Ratio (ER)** A measure developed by Perry Kaufman also known as the Fractal Efficiency Ratio, the Efficiency Ratio varies from 0 to 1 and is a measure of price movement compared to noise in the market. If price moves in an unbroken line for the period, the ER would be 1. If price returns to unchanged after moving away from the starting price, the ER would be 0.

**efficient markets hypothesis (EMH)** Perhaps the cornerstone of academic thinking about markets, the EMH essentially says that all available information is immediately incorporated into asset prices, and that there is no edge available to traders doing analysis based on that information. The EMH is a useful theoretical construct, but rests on a number of assumptions that are severely violated in practice.

**excess return** In general, the return of an asset or system minus the

risk-free rate. (The most common proxy for risk-free rate is a Treasury instrument of similar duration to the investment's holding period.) In many of the tests in this book, excess return is used in a slightly different context: the mean return of a signal group (defined as having the entry condition to be studied) over the baseline return for the control group.

**execution risk** A risk of trading in which the actual prices received for executions may differ from backtested results. In practice, liquidity conditions, execution skill, and trading size are primary contributors to this risk.

**exhaustion** See *climax*.

**expectancy or expected value** Mathematically, the expected payout of a scenario that has several possible outcomes is the sum of the probability of each outcome occurring times their payoffs.

**exponential moving average (EMA)** A type of moving average that weights recent data more heavily than past data.

**extension** In trend analysis, the third leg of the impulse-retracement-impulse unit that comprises the basic trend structure. Gauging the strength of the extension leg is one of the main ways to judge strength of the trend.

**fading** A general term for styles of trading that seek to trade *against* the direction of price movements. A trader fading an uptrend, for instance, would be shorting into that uptrend.

**failing** Usually used in reference to a support or resistance level, meaning that the level is failing to contain prices. This term, and *holding*, are more often used to describe dynamic price action than static market structure. See *holding*.

**failure test** A type of trade in which price penetrates previous support or resistance, and then fails to continue beyond that level. This is a potentially volatile trade, but it also offers very clear risk points and

profit targets.

**fast Fourier transforms (FFTs)** A mathematical technique for finding cycles in data.

**Fibonacci ratios** The idea that ratios derived from the so-called Fibonacci series {1, 2, 3, 5, 8, ...} describe price movements in financial markets.

**first-order pivots** A pivot high is a bar that is preceded and followed by lower highs; a pivot low has higher lows before and after. These pivot points are called first-order pivots to differentiate them from more significant pivots in the market structure.

**fixed fractional risk** A position-sizing plan that seeks to always risk a consistent fraction of the account's value (also called "equity" or "net liq") on each trade.

**flag** Another term for a pullback or consolidation in a trend.

**flow** A term coined by Mihaly Csíkszentmihályi to describe the state reached by elite performers in many disciplines in which the performer's mental capacity is completely absorbed in the task. Flow is a characteristic of top-level performance.

**free bars** Bars that are entirely outside bands or channels set on price charts—that is, with the low of the bar above the upper band or the high below the lower band.

**fundamental** Traditionally, technical analysis is the discipline of understanding market movements based on information contained in the price changes themselves. Fundamental analysis is the discipline of using financial statements, economic data, or other information to try to determine what the fair value for an asset should be.

**futile traders** A term coined by Larry Harris to describe traders who do not make money in markets, and who have no hope of doing so. Harris speculates that one reason they cannot understand the difference between their expectations and their results could be that

they are “of limited mental capacity.”

**good till canceled (GTC)** A qualifier attached to an order to indicate that it should not be canceled at the end of the current trading session. A good till canceled order may not work indefinitely; some brokers cancel these at specific times (e.g., end of quarter).

**handle** A term used to describe the whole numbers in futures markets. For instance, a move from 1,038.00 to 1,040.00 in the S&P 500 futures is a two-handle move. The equivalent term in stocks is a point.

**hedging** A term with many meanings, but generally to hedge means to take positions to protect against risks in another instrument. For instance, buying a put option is a classic hedging strategy for long positions. Proper hedging is trivial and can be expensive.

**high and tight flags** A specific type of flag that holds near the high of a sharp up move (or near the low of a sharp decline) that often suggests strong buying (or selling) pressure behind the move. These often lead to sharp continuation.

**higher time frame (HTF)** The highest time frame in a normal lower/trading/higher time frames scheme. Time frames are typically related to each other by a factor between 3 and 5.

**high-frequency trading (HFT) algorithms** Computer programs that rapidly execute orders, either for their own profit or to fill orders for clients.

**histogram chart** A type of chart that is useful for visualizing probability distributions. Events are placed into bins, and the height of those bins is graphed to show the shape of the distribution.

**historical volatility** Annualized standard deviation of returns. A common measure of volatility.

**hit the bid** Vernacular for selling (whether initiating a short or selling an existing long position) to the price on the bid. This is usually done when a trader needs to sell quickly, because she could possibly have

gotten a better (higher) price by putting offers in rather than hitting the bid.

**holding** A term used to describe a market that is unable to trade beyond a specific level or point in the market, or to the action of that level on the market. See *failing*.

**illusion of control** A term that describes a person's assessment of his own skill at a task that offers random reward. If the person appears to have some influence on the process, he will rate his contribution to the outcome as more important, even if there is no actual connection (e.g., a disconnected button that does nothing).

**impulse move** In technical analysis, a strong movement in the market, usually sharp and in one direction. Also called a momentum move.

**independent variable** In regression analysis, the variable(s) that is/are assumed to cause changes in the other variable.

**indicator variable** A variable that assumes the value of 0 or 1 depending on some condition. For instance, an indicator variable could assume the value of 1 if today's close is higher than the previous day's, or 0 otherwise. Averaging this variable across the data set would then give the percentage of days that closed up.

**inefficient traders** In Larry Harris's words: "Inefficient traders lack the skills, analytic resources, and access to information to trade profitably. They may do everything that profitable traders do, but they do not do it well enough to trade profitably."

**interfaces** The areas between trends, trading ranges, or trends in the opposite direction. These areas can be difficult to read, but they offer some attractive trading opportunities if the risks can be properly managed.

**interquartile range (IQR)** A nonparametric measure of dispersion calculated by taking the difference of the third and first quartiles. Also called the middle 50 because half (50 percent) of the data set's values

will fall in this range.

**Kelly criterion** A position-sizing plan designed to maximize equity growth if some simplifying assumptions hold. Violations of these assumptions can have catastrophic consequences, and violations are common in actual trading. If you choose to use a Kelly-style position-sizing scheme, make sure you understand the issues involved.

**Keltner channels** Originally invented by Chester Keltner, these bands were drawn around a 10-day simple moving average of the *typical price*, and offset by a 10-day moving average of the bars' ranges. Various modifications exist today.

**last print** The most recent transaction price in a market. May update very rapidly during the time the market is open. The last print of the trading session may not be the closing print in many markets.

**limit orders** A type of order to buy or sell with a price limit attached. The order will be executed only at the limit or at a more favorable price (i.e., limit buy orders will be filled at or under the limit price, and limit sell orders at or above the limit).

**linear regression** A mathematical technique for modeling the relationship between a set of variables.

**linearly scaled charts** Price charts in which the y-axis (vertical axis) is scaled so that equidistant ticks are equal-sized price movements.

**log scale chart** Price chart with the y-axis scaled so that equidistant tick marks on that axis are the same *percentage* distance apart.

**long-term investors** Typically, individuals or firms that buy assets intending to hold them for multiple quarters or years. As a general rule (and one that is not entirely correct), these players tend to be more focused on fundamental analysis than on technical factors.

**lower time frame (LTF)** In the standard three time frames scheme, the lowest time frame, below the trading time frame. Most traders use the LTF to time entries and to manage risk rather than for idea



generation and analysis.

**markdown** The classic Wyckoff market stage following distribution, corresponding to a downtrend in modern terminology.

**marketable limit orders** Limit orders placed on the wrong side of the market. In other words, marketable buy limit orders will be placed *above* the offer. These orders will immediately execute at the offer, as would a market order. However, if they remove sufficient liquidity from the book to drive prices higher, they will not be filled higher than the limit price. This order offers a compromise between urgency of execution and protection from adverse fills. See *market orders*.

**market makers** A set of market participants who, generally, are mandated to always be willing to buy and sell an asset in order to maintain an orderly market. Historically, many of these were floor traders, but this function is now generally fulfilled by computers and algorithms. Note that market makers have discretion to set the distance between their bids and offers, and they adjust this in response to market conditions.

**market orders** A type of order that will be executed immediately, theoretically at the best possible price. In most markets, customers have no recourse in the event of a bad fill on a market order, so these should be used with caution. Nearly all traders will find *marketable limit orders* to be preferable.

**market structure** The patterns of prices as revealed by swings connecting important pivot highs and lows. Skilled analysts and traders can use market structure to understand the balance of buying and selling pressure, and sometimes to derive an edge for the future direction and/or volatility conditions.

**markup** In Wyckoff's terminology, the market stage following accumulation, corresponding to an uptrend in modern terminology.

**mean** A measure of central tendency. In practice, this is what most

people mean when they say “average”: the sum of the values in a data set divided by the number of elements in that set.

**mean reversion** The tendency for markets to reverse large movements and to come back to a middle or average value. This does not necessarily mean that markets will pull back to moving averages. Different markets display different degrees of mean reversion at different points in the market cycle.

**mean-reverting** See *mean reversion*.

**measured move objective (MMO)** A technique used to set an approximate price target for a swing out of consolidation, based on the assumption that future volatility will resemble past volatility. This, and all other ratio-based measures, is better used as a guide than a precise target.

**measures of dispersion** Measures such as standard deviation, variance, range, and IQR that describe how data points spread out from a central value or set of values in a probability distribution.

**median** A measure of central tendency. If a data set is ordered from smallest to largest, the median is the middle value in the set. If there is an even number of data points, the median is between the middle two points, and is the mean of those two points.

**Micro Trendlines** A term used by Al Brooks to describe very small, short-term trend lines usually drawn between two to five bars.

**Modern Portfolio Theory (MPT)** A mathematical concept that deals with diversification and risk in a portfolio context, seeking to maximize portfolio return for a given unit of risk. The term *modern* in the name is a misnomer, because MPT comes from work Harry Markowitz did in the 1950s.

**modified MACD indicator** The moving average convergence/divergence (MACD) is a standard technical indicator. This book advocates the use of a simplified, modified MACD based

on 3/10/16-period moving averages.

**momentum divergence** There are several variations of this technical tool, but most of them look for a new high or low in price (relative to its recent history) that is not accompanied by a new high or low on a momentum indicator, such as the MACD. The assumption is that there was less conviction behind the move, so it is more likely to fail to continue.

**momentum move** See *impulse move*.

**Monte Carlo modeling or simulation** A mathematical technique, particularly useful in situations with many uncertain inputs that have many degrees of freedom or that are highly path-dependent. Monte Carlo methods essentially run multiple simulations and evaluate the results. A working understanding of these tools can help traders to bridge the gap to thinking in probabilities.

**motive force** A term used to describe the tendency of price to move from one level to another. This appears to be offset by the resistive force. Though there are no easy applications of these forces, they provide the theoretical backdrop for all technical analysis and technically motivated trading. In some sense, these two forces are the purest expression of buyers' and sellers' intentions in the market.

**moving averages** Tools used in technical analysis and signal processing that average values over a lookback window, called moving averages because the window moves forward with each new data point. There are many variations of moving averages used in technical analysis.

**multiplicative rule of probability** The probability of two independent events occurring is the product of their individual probabilities. This can also be adapted for dependent events, but in this case the relevant math is:  $\text{Prob}(A \cap B) = \text{Prob}(A) \times \text{Prob}(B|A)$ .

**next trend leg** The trend leg following a consolidation.

**noise traders** Traders who have no reason or motivation for trading, and whose interactions with the market are irrational and erratic, known informally as the “idiot traders.” In reality, the actions of many small traders essentially resolve into noise on most time frames, and cause slight deviations between price and value, even in efficient markets.

**normal distribution** A probability distribution that describes many events and conditions in the natural world. Unfortunately, it is also frequently applied to market situations, with potentially disastrous results. Normal distributions rarely hold in asset prices or returns.

**null hypothesis** In statistical hypothesis testing, the null hypothesis is the default assumption, usually that there is no effect or relationship in the data being examined. Note that this hypothesis can never be proven. Rather, the technique is to look for information that would contradict this hypothesis and cause it to be rejected in favor of the alternative hypothesis.

**O%Rng** A measure of where the open lies within the trading session’s range, expressed as a percentage of that range. For instance, O%Rng of 100 percent means the open is at the high of the day’s range, while 0 percent indicates the open is the low tick of that session.

**offer** See *ask*.

**open** In intraday data, the first tick of the bar. In daily data, opens are usually set by an auction process and may not be the first trade of the day. Also, most markets have electronic sessions that precede their official opens, so the instrument may have traded for many hours before the opening print.

**opening range** A term used to describe the range price trades within a specific time following the open. Traders may use opening ranges from a few minutes to an hour.

**opening skew** The tendency of the opening print to cluster near the high or low of the session, rather than to be somewhere in the middle. This is commonly assumed by traders to be evidence of a market inefficiency when in fact, it is completely explainable by the properties of random walks.

**optimal f** An alternative to the Kelly criterion. Optimal f is another answer to the position-sizing problem. Developed by Ralph Vince, it may be more robust in some trading applications than the Kelly criterion.

**out-of-sample testing** In system development or backtesting, part of the data set is usually held back for an out-of-sample test once development is complete. For instance, if you have 10 years of price data, perhaps you would do development on eight of those years and hold the last two for an out-of-sample test. Note that out-of-sample testing can be done only once; after that, the data set is contaminated and should be considered part of the sample.

**outliers** Events that fall far outside the range of normal events.

**overbought/oversold indicators** A class of technical indicators that try to identify markets that have moved too far in one direction and are poised for reversal. These indicators could provide entries for mean-reversion trades, but careful testing is needed.

**pairs strategies** A term usually reserved for spread trades between different stocks. See *spread trading*.

**paper trading** A tool sometimes used by developing traders that involves placing trades in a simulated environment. (The term does not imply literal use of pencil and paper.) Paper trading has limited utility because it cannot replicate the psychological challenges of having money at risk.

**Parabolic SAR** A trading system originally developed by Welles Wilder that was designed to always be in the market, reversing long or

short according to signals generated from price movements. (SAR stands for stop and reverse.)

**path-dependent** Refers to a scenario that can have different values or outcomes depending on decisions or outcomes at different steps in the process.

**pay the offer** A term that means to buy an asset directly at the offered price, without attempting to bid for a lower (better) price. Market orders should equivalently pay the offer, but there is the danger of large and uncontrolled slippage.

**per-unit risk** The difference between the entry and exit price on a trade, or the risk to be taken on one unit (share, contract, etc.) of the instrument.

**pivot high or pivot low** See *first-order pivot*.

**pivot points** See *first-order pivot*.

**point and figure charts** A charting technique, mostly obsolete, that charts reversals from pivot points. The x-axis is not scaled for any fixed unit; rather, it moves forward when the specified reversal from the pivot has occurred. This was a technique historically used by floor traders that still finds some applications in computerized trading.

**population** In statistical testing, usually considered to be the set of all possible events or items with the characteristic being studied. The population is usually unseen and unknowable, so the central problem of inferential statistics is to try to understand the characteristics of the population based on samples taken from that population.

**positive expectancy** See *expectancy* or *expected value*. A positive expected value suggests that a trader is likely to make a profit over a large enough sample size of trades, provided there is good execution and the expected value is larger than transaction costs.

**post hoc** From the Latin term meaning “after this.” Refers to events usually defined after the analysis or experiment is concluded.

**preceding trend leg** In the impulse/consolidation/impulse framework, this is the initial trend leg that sets up the consolidation.

**price action** A term that refers to a formalized understanding of how prices move. Price action is usually most visible on lower time frames, and price action creates market structure. In the terminology of a certain subset of retail traders, “price action trading” refers to trading without any indicators or moving averages, but this is mostly a meaningless distinction.

**price rejection** The characteristic pattern of support and resistance holding: price makes an immediate (in the context of the time frame) and sharp move away from the level. The absence of price rejection suggests a higher probability of the level breaking.

**profit target** Some technical systems set profit targets for part or all of the position. In general, traders using systems like this should develop the discipline of entering their profit-taking orders as soon as the trade is initiated.

**proper pyramids** Pyramids that start with the largest number of units they will ever have at a level. These strategies can usually endure volatility at the end of a trend much better than reverse pyramids.

**pullback** A general term for a consolidation pattern in a trend. Many of the traditional distinctions of technical analysis (flag, pennant, box, etc.) are not meaningful, as all pullback patterns can be traded according to similar rules.

**pyramiding plans** Plans for adding additional units to a trade once the trade has moved a specific distance into profit.

**random walk hypothesis (RWH)** A theory that says that asset prices can be described by random walks. Various forms and dimensions of random walks exist. In practice, the RWH seems to hold reasonably well for some assets and some time frames.

**range** The high-low of a bar or trading session.

**range expansion** A term to indicate more directional movement in markets. A market undergoing a range expansion phase will probably trend in one direction, the range of bars will probably expand, and measures of volatility will increase on some time frames.

**real trend line (RTL)** A technique for drawing a trend line that marks the important inflections in trends, usually best-suited to application on longer time frames.

**relative strength** A term used to describe relative price movements between markets. Skilled traders and analysts can find clues to institutional conviction and large-scale money flows in relative strength.

**Relative Strength Index (RSI)** A technical indicator that seeks to identify overbought or oversold markets by measuring the relative distribution of up and down closes. Note that it does not measure relative strength, nor is it an index.

**resistance** A term attached to price areas that may provide a barrier to advancing prices, or areas where sufficient supply may exist to stop prices.

**resistive force** See *motive force*.

**retracement** Another general term for consolidation, pullback, or a pause in an established trend.

**return series** Most financial markets generate data as a series of price changes. It can be difficult to compare price changes across different price levels (e.g., a \$5 change in a \$10 asset is very different from a \$5 change in a \$1,000 asset). The first task of any market analysis is usually to convert the price changes into a return series. This can be either a percent return ( $P_{today}/P_{yesterday} - 1$ ) or a continuously compounded return:  $\log(P_{today}/P_{yesterday})$ .

**reverse pyramid** A type of pyramid plan common in marketing



literature for trading systems, but unacceptable for practical application. In these plans, the trader starts with a small position and then adds more units as profits from the trend allow the trader to pay for new units. For instance, a trader might start with one contract, adding two, four, and then eight at successive steps. These plans incur unmanageable volatility and drawdowns.

**reward/risk ratio** This ratio has many uses and applications, but a few points must be kept in mind. First, much of the literature uses “risk/reward ratio” when authors actually mean reward/risk ratio in nearly all cases. This book’s terminology, while perhaps slightly awkward, is precise. Second, there is no innate bias to high reward/risk trades; this ratio must be understood in the context of expected value. Last, it is meaningful only over a large set of trades.

**risk-adjusted returns** It is possible to increase returns in a portfolio or trading system by increasing leverage, but true outperformance must come on a risk-adjusted basis, meaning that returns increase more than risk. Simplistic measures like the Sharpe ratio can help to build intuition about this concept.

**risk-free rate** In finance, the rate an investor could have realized in a theoretically risk-free investment. In practice, a U.S. Treasury bond, bill, or note with a maturity approximately equal to the intended holding period of the investment is usually used as a proxy for the risk-free rate. An investor must achieve higher returns than what she could have attained in a risk-free investment, so this is used as a hurdle rate in many applications.

**R multiple** If the risk (R) for every trade is known before the trade is entered, the profit and loss (P&L) can be expressed as an R multiple. For instance,  $1\times$  (one times R) would mean that the profit was exactly equal to the initial risk taken on the trade.

**R-squared or  $R^2$**  In a regression or correlation analysis, a measure of goodness of fit that shows how well the line fits the data. Often

understood to be the percentage of the dependent variable's changes that are explained by the model.

**rule of alternation** In Elliott wave theory, the idea that retracements in trends tend to alternate between simple and complex consolidations.

**sample** In inferential statistics, samples are smaller sets taken from populations.

**scaling in** Refers to a style of trade entry where the trader builds a position, usually as it moves against the intended trade direction. For instance, a trader scaling into a long trade will usually be buying small pieces (perhaps 20 percent to 33 percent at a time) of the total position size into declines. This can be an effective entry technique for some styles of trading, but firm risk management rules are essential.

**scalping** A style of trading that takes very small but consistent profits. Scalpers need to focus on low transaction costs and on avoiding sizable losses, as a single large loss can wipe out many profitable trades. This term is also sometimes generalized to other time frames and styles of trading if the profits and losses are a small percentage of the average range on that time frame.

**scatterplots** A tool used to visualize the relationship between data sets.

**seasonal** Many markets exhibit somewhat predictable tendencies at certain times. Traditionally, this term applies to, for instance, grains at harvest time or natural gas spreads at certain times of the year. However, it can be generalized to time of month (are some markets strong or weak near the beginning or end of the month?) or even time of day for some markets.

**second-order pivot** A pivot point that is preceded and followed by lower *first-order pivots* for a second-order pivot high (reversed for pivot lows).

**semistrong form EMH** A variant of the efficient markets hypothesis that postulates that all publicly available information is incorporated in price. If this is true, it would not be possible to achieve superior risk-adjusted returns based on any publicly available information.

**setup leg** Another term for the preceding trend leg, or the leg that sets up a retracement.

**Sharpe ratio** A simplistic measure of risk-adjusted performance.

**short** To short or sell short is to sell an asset with the idea of buying it back later at a lower price. For most new traders, buying and selling higher is intuitive, but most professional traders are as comfortable shorting and buying back lower. (In this case, the sequence is “sell high, buy lower,” which is still profitable.)

**significance testing** A statistical testing technique that attempts to evaluate the probability that the results could be due to chance and not to the presence of an actual signal in the market. (*Note:* This is a complex topic. This explanation is market-specific.)

**simple moving average (SMA)** A tool commonly used in technical analysis that averages prices over a lookback window, moving this window forward with each trading bar. For example, a 20-period SMA would average the past 20 bars' prices.

**size effect** Smaller stocks (in terms of market cap) tend to outperform larger stocks, but there may be offsetting risks.

**slippage** The difference between the intended and achieved execution prices. A cost of trading or an element of transaction costs.

**spread** This term is used in two different contexts: First, it is the distance between the bid and the ask in markets; wider spreads usually indicate less liquidity and higher costs of trading. Second, see *spread trading*.

**spread trading** A type of trading strategy that seeks to profit from changes in the relative value of a set of markets by being long and

short different assets. This technique is an important part of most professional traders' tool kits.

**springs** The opposite of upthrusts: Price trades below support and immediately fails to carry lower. The quick recovery shows underlying buying pressure and potential accumulation.

**standard deviation** A measure of dispersion, also used as a (potentially poor) proxy for risk in many financial analyses.

**Standard Deviation Control Chart** A tool to visualize the variation in a trader's returns over time. Can be used to highlight potential problems and issues with changing performance.

**standard deviation spike** An indicator that standardizes each bar's price change for current volatility conditions.

**stationary** In a stationary time series, the properties of the distribution do not change over time. Note that this is not the same as saying prices do not move or trend; stationarity refers to the shape and location of the return distribution. There is debate about whether financial markets exhibit stationarity.

**Stoller Average Range Channels (STARC)** A modern variation of the Keltner Channel concept.

**stop and reverse** A trading strategy that, rather than exiting the market, flips from long to short and vice versa when a stop level is hit.

**stop-loss point** An initial point for directional trades, established at the time the trade is entered, where a loss will be booked on the trade. Stop-loss points must be placed outside the noise level of the market and at price levels where the trade is decisively wrong. Setting correct stop-loss points is a combination of art and science.

**strong form EMH** A form of EMH that states that all information, even secret inside information, is incorporated in the price. Used today as a theoretical concept only, and well refuted by a number of events and empirical studies.

**supply line** Another name for a downward-sloping trend line, drawn above prices. So-called because it represents an area where supply has been sufficient to meet demand and stop the upward movement of prices in the past.

**support** A price area where it is anticipated buyers might offer enough buying interest to hold prices above the level. The study of how price acts around support and resistance is one of the building blocks of technical analysis.

**survivorship bias** Survivorship bias covers a range of logical errors and mistakes that may come from examining the surviving members of a game of chance or another selection process. It is almost always better to examine the entire group before the selection process, as the survivors can give misleading impressions about the process and the probabilities involved.

**swings** Price movements from one level to another. This is an imprecise term with some overlap between swings and trends. (Chapter 2 offers a structured approach to defining swings based on pivot points and market structure.)

**swing trading** Formally, a style of trading that seeks to profit from the next swing in the market. Swing traders generally do not scale in, and do not attempt to hold through large, adverse price movements. Informally, many writers use this term to describe the trader who focuses on three-day to two-week holding periods, but this is a faulty definition of the term.

**systematic trading** Usually refers to a style of trading that is rule-based and that could be at least partially computerized.

**tail risk** The risk of large outlier events at the tails of a probability distribution. These risks are mostly unhedgable except at great cost, and they create serious problems for traders and risk managers.

**technical analysis** Technical analysis is the discipline of gauging the

probabilities of future price movements and/or volatility conditions based on information contained in price changes themselves.

**theory of mind (ToM)** The ability to attribute mental states and emotions to others, and to understand that they have beliefs, desires, and intentions different from our own. Some researchers postulate that this theory also forms the basis for market intuition.

**three pushes** A typical end-of-trend pattern consisting of three symmetrical (in both price and time) pushes to a new high or a new low, followed by a reversal that shows a distinct change of character.

**time frame** Usually means the time period of the bars on the chart. For example, the 5-minute time frame would refer to a chart with 5-minute bars. Can also be used to describe a scheme where a trader looks at several time frames of the same market, and refers to them as lower, higher, and trading time frames.

**trading time frame (TTF)** In the three time frames scheme, this is the main, or focus, time frame. Lower and higher time frame charts may support decisions made based on the trading time frame.

**trailing stop** A system of trade management that moves the stop to lock in profits as the trade moves in the intended direction.

**transaction costs** The costs involved in participating in a market. They cover all financing, commissions, fees, the bid-ask spread, and any adverse effect your own order has on prices. Most traders, particularly retail traders, have a poor understanding of transaction costs.

**trend continuation** A class of trades that seeks to enter an established trend in the direction of that trend. Many trend continuation trades are based on entering in consolidation areas or pullbacks.

**trend following** An entire industry has been built around the term *trend following*. Many adherents of this school claim that trend following is far superior to other methods of trading, that it is easier

than other types of trading, and that it essentially is the holy grail. None of these things are true. Trend following is a style of trading that usually attempts to position with a trend, with the idea that the trader may have to sit through significant whipsaws and drawdowns.

**trend termination** A class of trades that seeks to enter an established trend *against* the direction of that trend, with the idea that the trend is coming to an end. Note that these trades are not simply plays for trend reversal, as many of them will simply transition into trading ranges.

**true range** The range of the bar plus any gap from the previous close. In other words, if the low of the current bar is above the previous bar's close, the *range* of the current bar is the high-low. The *true range* of the bar is the range + (current bar's low - previous bar's close).

**t-test** A common statistical significance test.

**typical price** The average of the high, low, and close for any trading bar.

**upthrusts** The opposite of Wyckoff's springs: price thrusts above resistance and immediately fails to carry through. This is also a type of failure test and a sign of classic distribution.

**variance** The square of standard deviation, and a measure that is not particularly useful in most market applications because the units are units squared. (For instance, variance of price changes in USD would be in units of USD<sup>2</sup>.)

**volatility clustering** The tendency of high and low volatility areas to cluster together in market-derived time series. This is also a reflection of markets moving through different volatility regimes.

**walk-forward testing** A complement to backtesting, in which rules are applied to historical prices. In walk-forward testing, the rules are applied to fresh market data as it is generated. This is essentially a form of papertrading.

**weak form EMH** A form of the EMH that holds that information contained in past prices cannot be used to predict future prices. If this form of EMH is true, then the discipline of technical analysis is invalid.

**whipsaws** The tendency for many technical tools, systems, or indicators to accumulate many small losses while markets chop back and forth in trading ranges. For many of these systems, whipsaws are an unavoidable fact of life and must be offset by profits from trending markets.

**z-score** Also called a standard score, normal score, or a z-value: the number of standard deviations above or below a mean that a variable lies.



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Ann Taylor (NYSE: ANN)

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AUDJPY (Aust Dollar/Japanese Yen)

Average Directional Index (ADX)

Average True Range (ATR)

Baidu, Inc. (BIDU)

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Baruch, Bernard

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Baidu Inc. (BIDU)

Bear flag. *See* Complex consolidation Bear market

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- formation of candles

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Caterpillar, Inc. (NYSE: CAT)

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- ideas for using

- slide outside the bands

- spike through both bands

Chart analysis *See also* Chart patterns Charting, general principles:

- bars, candles, other choices

- generally

- linear vs. log scale

- time frame selection

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- bars and candles

- classic

- “gently rounding top,”

- tick charts

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- charting by hand

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- price action/market structure (*see* Price action/market structure) Clean

- tests/clean levels

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- blow-offs/parabolic moves

- buying

- DJIA, crash of 1929

- failures

- failure test following

- fast line behavior in

- parabolic (*see* Trading parabolic climaxes) parabolic blow-off into

- patterns of

- selling

- terrorist attacks and

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- biases concerning losses

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- pullback trades and

- uptrending market and

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Connors, Laurence

Consolidated Edison, Inc. (NYSE: ED)

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Directional Movement Index (DMI)

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- complex consolidation

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Failure test trading template:

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Goldman Sachs Group (NYSE: GS)

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breakouts, entering in preceding base  
breakouts, entering on first pullback following breakouts, failed  
complex pullbacks  
failure test  
generally  
pullback, buying support or shorting resistance pullback, entering lower time  
frame breakout Trading time frame (TTF)

Trading without an edge

Trailing stops

Trend(s). *See also* Moving average trend indicators analysis of (*see* Trend analysis) continuation of (*see also* Trend continuation trade examples) definition of

Dow Theory

emotional cycle and

endings of

fundamental pattern

generally

going against (*see* Countertrend position) integrity of

lines (*see* Trend lines) location in, pullbacks and

moving average and

parabolic

ranges and (*see* Interfaces between trends and ranges) rate of

retracements and

structure of (*see* Trend structure) terminations (*see* Trend termination(s)) time

frames and

to trading range

with-trend

Trend analysis:

complex consolidation

Dow Theory trend patterns

generally

indicators

length of swing analysis

slope of single moving average

trend legs and

trend lines in (*see* Trend lines) Trend-continuation gap

Trend continuation trade examples:

complex pullback trade (EURUSD)

complex pullback trade (U.S. Treasury Notes) pullback, high and tight

pullback, lower time frame climax entry pullback, nested

pullback failure at previous swing

pullback failure: goes flat after entry pullback failure: strong momentum

develops simple pullback, breakout entry (PAY)

simple pullback, breakout entry (ZAGG)

Trend legs, character of

Trend lines:

flat markets and

horizontal

moving averages and

nonstandard

one-to three-bar

parallel

pullbacks and

rate of trend and

standard

Trend reversal. *See also* Trend to opposite trend Trend structure:

climaxes (*see* Climaxes) fundamental pattern

generally

impulse and momentum

impulse/retracement/impulse pattern

measured move objective (MMO)

pullbacks (*see* Pullback(s)) three pushes

Trend termination(s):

generally

trades (*see* Trend termination trade examples) into trading ranges

Trend termination trade examples:

failure test

failure test, other variations

failure test, second-day entry

Trend to opposite trend:

- generally

- parabolic blow-off into climax

- parabolic exhaustion, expectations following Trend to same trend

Trend to trading range:

- generally

- trade management issues

Trend trades. *See* Trend continuation trade examples; Trend termination trade examples Trend/trading range bars

TTF. *See* Trading time frame (TTF) “Turkey shoot,”

Turtles, the

“2B” trade

Two-legged pullbacks

Tzu, Sun

Uncertainty as risk

Upswings

Upthrusts:

- distribution and

- in idealized trading range

- Wyckoff

Uptrend:

- buying pressure and

- defined

- in idealized Dow Theory

- markup as classic

- pullbacks in

- relative strength and

- upswings/downswings in

USDCHF (U.S. Dollar/Swiss Franc)

U.S. Dollar Index futures

U.S. Steel Corporation

U.S. Treasury Bond futures



Verifone Systems Inc. (NYSE: PAY)

Vince, Ralph

VirnetX Holding Corporation (AMEX: VHC) Volatility:

compression

contracted

expansion

high, breakouts and

intraday

stops and

strategies, equivalent

trading ranges and

## **Volume**

von Moltke, Helmuth

Waitzkin, Josh

Walt Disney Company (NYSE: DIS)

“Weak-hand longs/shorts,”

Wheat futures:

Bollinger bands/Keltner channels

momentum divergences in

parabolic blow-off into climax

pullback failure/strong momentum

three pushes pattern

Wilder, J. Welles, Jr.

Win Ratio Control Chart

With-trend trades:

countertrend setups vs.

exits

fundamental patterns

Wyckoff, Richard

Wyckoff four-stage market cycle. *See also* Four technical trades accumulation

cycle in action

distribution

four phases/classic cycle  
fractal markets and  
generally  
markdown/bear market  
markup (uptrend)  
Wyckoff springs/upthrusts

XOMA Ltd.

Yingli Green Energy Holding Company Ltd. (NYSE: YGE)

Zagg, Inc. (Nasdaq: ZAGG)

Zeno's paradox