PART I

Understanding Your Mind

CHAPTER 1

Traders' Mental Blind Spots

Colin had been watching the S&P e-mini futures all morning, waiting patiently for a trade. Finally, he saw one setup. He looked carefully at both the price action and the indicators he used to qualify his trades. Everything met his criteria. Price had turned bullish and all indicators were signaling long. "There's no flaw in the setup," he thought.

The trade started working almost immediately. The market moved up smartly, breaking a nearby resistance level and then moved into "clear air" where no other resistance was located. The S&Ps rallied for twelve points from the trade entry—an excellent intraday run for this market. But, Colin was not on board.

He didn't take the trade. When discussing this later, he said, "The same setup occurred yesterday. I guess I was thinking of that trade, which I took, but it didn't work out. I had a loss. There was even a slight difference in favor of today's trade. One of the indicators did not confirm yesterday. Today's setup was picture-perfect. I kicked myself for not taking the trade. I don't really understand why I didn't take it. I wasn't feeling any big emotions; I certainly wasn't fearful. I just thought that since yesterday's trade failed, this one would, too. I was wrong. Why didn't I take the trade?"

What failed Colin was not his emotions or misreading the market. What failed Colin was his thinking. Colin's mind entered a natural mental blind spot psychologists call the *recency effect*. The recency effect is a cognitive bias where our mind weighs the latest information with greater importance than other data when making decisions. In Colin's mind, yesterday's outcome weighed more heavily than today's "picture-perfect" criteria, leading him to shun the trade.

Many traders believe emotions are the most important aspect of trading psychology. This is only partially true. Feelings and emotions are certainly important. Traders cannot make reliable decisions without them. Strong emotions such as greed, anger, and especially fear can significantly influence trading and cause erratic trading behavior. However, emotions are not the only thing that can influence trading. Thoughts and the way we think also play a significant role. Sometimes, thoughts ignite strong emotions and thinking almost always amplifies them. At other times, as we see in Colin's case, emotions play little part in poor trading decisions. Less familiar to many traders is the role that our mind and our thinking plays in trading and the way we make trading decisions.

Our thinking can create mental blind spots that can shackle us, as the example with Colin shows, rendering technical skills useless at that moment. In fact, how we think and how we treat our thoughts are the most important aspects of trading psychology. A main objective of this book is to help you become more aware of your thoughts and how they directly influence your trading actions. Learning and applying skills related to cognitions described in this book may have the most decisive impact on our trading—they can be far more potent than some of the common things we try in dealing with emotions. Of course, this does not mean that emotions are unimportant and should be ignored. We discuss emotions starting in the next chapter. To begin, however, we focus on the natural constraints that arise from our thinking as one of the key aspects of trading psychology that traders need to become aware of and understand in order to trade well.

Thinking is integral to being human. It is so much a part of us that we usually don't think much about thinking. If we pause for a moment and observe our thoughts, however, we begin to become aware of the activity of our mind. This is a fascinating study. We soon realize that we have a near-constant, never-ending stream of thoughts. The mind is tirelessly commenting and telling us things. Unless you practice, you will find it impossible to quiet your mind and stop the flow of thoughts for all but a few seconds. Even with practice, quieting the mind for more than a few minutes before another thought involuntarily arises is elusive for most people. Two important characteristics of our minds thus emerge: thoughts are always with us and we do not have much control over them. This is essential data for traders.

Because we have experienced our mind's chatter every day for as long as we can remember, we are accustomed to it and rely on it heavily. We tend to accept whatever our mind tells us as an accurate reflection of reality. We rarely question or objectively evaluate our thoughts. Because thoughts are a natural part of us, accepting them seems natural, too, but in trading, this can be dangerous.

Part of the danger comes from natural limitations in our cognitive capabilities. There are certain mental boundaries that often constrain the way we think, distort the way we process information, and impact the way we make decisions that cause predictable errors in trading. These are our mental blind spots commonly referred to

as cognitive biases and heuristics. The most important mental blind spots for traders include:

- The representativeness heuristic
- The recency effect
- Loss aversion
- Confirmation bias
- Base rate neglect
- The affect heuristic
- Hindsight bias
- The endowment effect
- Optimism bias

We discuss most of these mental blind spots in this chapter. Some—notably loss aversion and optimism bias—are covered in later chapters. Understanding these mental blind spots and becoming aware of them in one's own trading are crucial for the trader as they can directly affect trading performance and results.

Heuristics and Cognitive Biases

The term *heuristic* is just another word for mental shortcut. When faced with a complex or difficult decision, people often simplify their task by applying an abbreviated rule set to help problem-solve and make the decision. This streamlines the thinking chore into a more straightforward and manageable job. Heuristics shorten the decision-making time and reduce the mental load. Their use allows people to function efficiently and quickly without having to mentally process and make sense out of a large amount of data. These mental shortcuts are handy in many situations and produce reasonably accurate results much of the time. For an example, let's say we are planning a trip and need to budget gasoline expense for driving. To do this, we need to know how many miles can be driven on a tank of gas. One way to do this is to keep detailed records on gallons and mileage for each fill of the gas tank for the next six months and then calculate the average. It would produce an accurate figure of miles per tank of gas across many different driving conditions, which we can then use to calculate fuel costs. Alternatively, we can use a simple shortcut of setting the odometer to zero when the tank is next filled and apply the mileage gotten from that one tank of gas for our fuel cost projection. Will the shortcut be as accurate as gathering six month's worth of data? Probably not, but the simple approach produces a good enough result for our trip planning purposes. That's using a heuristic.

Heuristics are used all the time. When deciding to go into an unfamiliar restaurant, for example, we might use the restaurant's overall appearance in making our judgment. Rather than taking a survey of patrons' dining experiences as they exit, if the restaurant looks clean and inviting, and there are cars in the parking lot, we are apt to dine there. Note that an easier mental task is substituted for a harder one. This is a hallmark characteristic of heuristics. It's easier to assess the appearance of the restaurant than interview its patrons. Likewise, it is easier to calculate mileage from one tank of gas than to record and process mileage data over a six-month period for estimating driving expenses. Heuristics have value; they help us manage our world efficiently. Because they are effective and do have such value, we normally apply them as our default mode of thinking.

There are times, however, when heuristics and other abridged mental processes lead to significant errors and inconsistencies in our judgments. In their pioneering work on how we think and how we produce thinking errors, two psychologists—Nobel laureate Daniel Kahneman and Amos Tversky—found that when people make decisions under conditions of risk and uncertainty, they have a strong tendency to abandon careful rational analysis and, instead, apply heuristics and other cognitive short cuts. This often produces predictable errors and poor outcomes. Their research was in striking contrast to the conventional wisdom at the time it was published. This and subsequent work spawned a new discipline emphasizing psychology's influence on economic decision making now known as behavioral finance.

Kahneman and Tversky's research was followed by a long line of studies that demonstrate how natural limitations in our information processing—that is, how we observe, think, and problem-solve—automatically emerge in situations that involve the assessment of complex and often incomplete data and also entail risk and uncertainty in outcomes. The research is clear, robust, and their findings are significant for the trading world: in uncertain, risky conditions the application of heuristics and other cognitive biases in making decisions often results in significant errors and costly mistakes. Trading always involves risk. Trade outcomes are never certain, and traders confront complex and incomplete data in every trading judgment. When traders favor mentally efficient thinking shortcuts known to produce errors, they end up making poor trading decisions and these lead directly to poor trading results.

We saw this with Colin and his weighing of a recent trade outcome, which caused him to miss a sound trade. What makes it difficult for traders is that what works well in everyday life can lead to costly errors in our trading lives. Consider Jackie who has just moved into the city and now walks to work. Over the past two weeks she has enjoyed her walk in the warm, early morning sun. But yesterday, a cloud-burst drenched her and she arrived at the office sopping wet. Today, she carries an umbrella. This is an adaptive use of a recent experience. Contrast this with Colin's missed trade. Like Jackie, Colin also had an unpleasant experience in the form of a trading loss. The next day with the same type of trade setting up, Colin weighed yesterday's

failed trade outcome—which has no bearing on today's trade and was irrelevant to his decision—as more significant than today's textbook trade setup because what happened yesterday was fresh in his mind. Jackie stays dry; Colin misses a good trade. Afterward, Colin could not understand why he didn't take a sound trade. This is the poignancy of using heuristics and cognitive biases in trading. Because we do use them so frequently in day-to-day decisions, it's natural that we readily bring heuristics and other cognitive biases into our trading. Because we also trust what our mind is telling us unquestioningly, we can be mentally blind to the serious trading mistakes we are making as we make them. It is crucial for all traders—from novice to the more experienced—to understand and become aware of these blind spots. We start with what is likely the most common trading heuristic called representativeness.

Representativeness

The *representativeness heuristic* means that we use a mental shortcut that looks for similarity between the current situation or event and its overall class as a way to judge probability. If an event is similar to our model or prototype, then we assume that the event has the same probabilities as the model. Representativeness occurs when something appears (or represents itself) to be likely, when, in fact, it may not be likely. An example from outside of trading will help clarify representativeness.

When buying a used car a buyer may look for dents, lift the hood, and kick the tires. If the engine looks clean, the car is shiny, and the tires look new, he may think, "This car has been maintained well." That's using the representativeness heuristic; however, mere appearance can be misleading. It is only by reviewing maintenance records and having the car checked out by a mechanic will the buyer be able to accurately assess the probability that this is, indeed, a well-maintained vehicle worth buying. Simply relying on appearance does not mean it is a sound car, even though it looks good. In our mind, the car represents itself as a well-maintained vehicle. Substituting the car's appearance for a thorough mechanical assessment is the cognitive error. In trading, representativeness is often seen in traders who scan the market action to see if it matches a prototypical chart pattern. For example, current market action might look to a trader like it is forming a bull flag, and he goes long. But that is like assessing only the car's appearance for its actual condition. If the chart formation is occurring after a lengthy trend, what appears to be a bull flag could instead be distribution. Simply matching market action to a chart pattern speaks only to pattern recognition. It does not speak at all to the probabilities of the next market direction.

It is very difficult for our minds to assess probabilities. Mentally, it is far easier to make a judgment that price action looks like a bull flag than it is to assess the probability that the market will act in a certain way or have a specific outcome. As we saw when evaluating the appeal of an unfamiliar restaurant or the condition of a used car,

heuristics involve the substitution of an easier mental task for a more difficult one. We ask a question that is easy to answer: Does this look like a bull flag? The correct question is: What is the likely next move of the market? The easy answer to the easy question has us taking a long position. The correct question was never asked because it requires more involved thinking. The correct question may lead us to the conclusion that the market is overbought, has stalled at a higher time frame resistance level, and what initially looked like a bull flag is now seen as a market unable to rally farther and about to fall. We will use the following case example involving Zoe, a swing trader, to illustrate representativeness further.

Case Example: Zoe

Zoe was trading EZU, the Exchange Traded Fund for the MSCI European Monetary Union Index. She saw the weekly Bullish Engulfing Candle pattern in late June and went long. You can see what she had seen in Figure 1.1. She anticipated a continuation of the weekly uptrend, which looked strong to her. Zoe noted that every bullish engulfing pattern in this uptrend worked well. Thus, she expected a winning trade

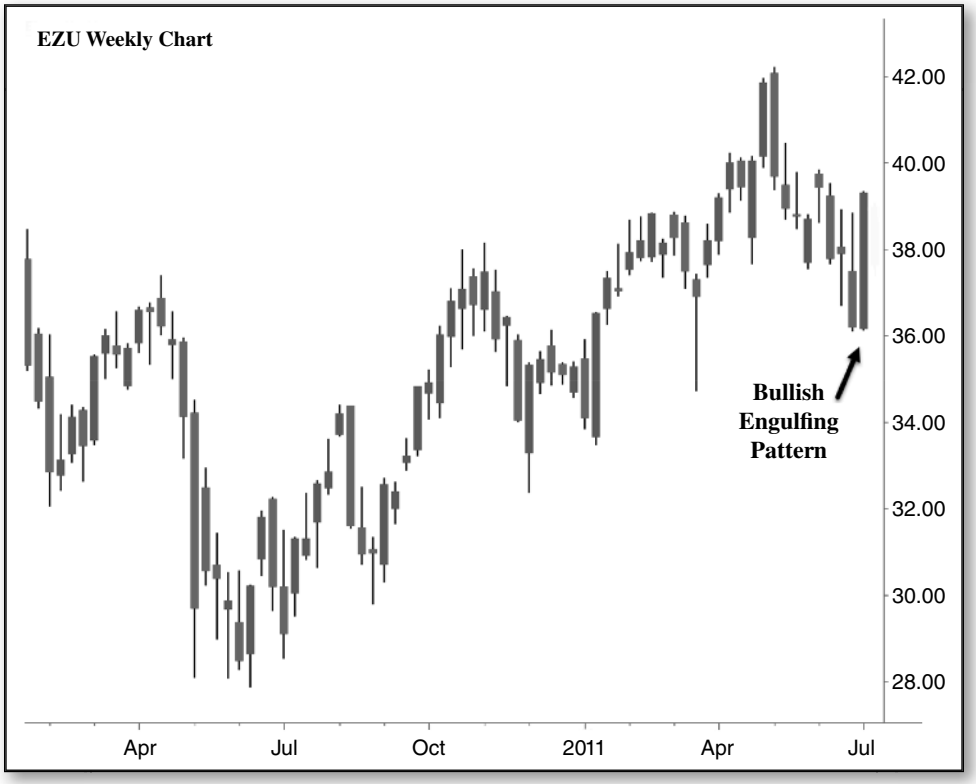

FIGURE 1.1 Zoe's Weekly Chart Depicting an Uptrend
Source: TradeStation Technologies, Inc.

that would take price and her trading account to new highs. Shortly after taking the trade, however, she became despondent. Almost immediately, the market fell below her stop and she suffered a loss. Zoe couldn't understand why this happened. "Everything," she said, "looked perfect."

But everything wasn't perfect. Stepping up a time frame to the monthly chart, we see that this higher time period had recently produced a Dark Cloud Cover that caused this market to fall below the 2009 high just a few weeks before she entered her trade. Figure 1.2 depicts this vital monthly data. Zoe's mind didn't take this information into consideration.

Zoe focused only on the weekly chart with its bullish candle pattern. To her mind, the candlestick unquestionably appeared as another strong signal in the uptrend. Note that Zoe chose to answer the easy question: Is this a bullish engulfing pattern? Of course, the answer is yes. The more difficult and more important question—what

FIGURE 1.2 Higher Time Frame Dark Cloud Cover Pattern
Source: TradeStation Technologies, Inc.

is the likely next move of this market?—was never considered. Zoe committed the characteristic thinking of representativeness: she mistook appearance for probability and went no further than asking whether price matched a candle pattern. Remarkably, Zoe had no doubts about this trade. "I took one look at the chart and *I immediately knew* this would be a good trade," she said. "I felt certain about it." She was so convinced and confident about what appeared to be represented in the weekly chart, she neglected the higher time frame information, and, of course, read the market incorrectly.

The bullish engulfing pattern had the appearance of a strong setup, but it occurred immediately after higher time period weakness. The *base rate* probability of the negative monthly price action trumps the odds of a weekly bullish setup. And, just because the bullish engulfing pattern was working recently in the uptrend does not guarantee it will continue to work. Again we see the recency effect extracting its toll on the trader. Recall that recency was the cognitive bias that caused Colin to miss a sound trade. When more weight is assigned to what happened most recently, errors in judgment increase. In trading, we tend to look at a lot of information: news, indicators, price action, morning calls, economic reports, newsletter recommendations, and the like. What tends to stick in our head is what occurred last and even what was looked at last. This can become overweighted in our decision process. In the ETF Zoe was trading, recent similar bullish engulfing patterns pushed the market higher. These preceding events were most salient in Zoe's mind and therefore weighted heavily.

You can see that it is easy to make these errors. The trade setups and price action look good, but are false. It is not that the market is trying to fool you, but that our minds frequently make quick, unstudied judgments by applying mental shortcuts that lead to errors and trading losses. Recall that Zoe said she "immediately knew this would be a good trade." She didn't carefully analyze the market. Her mind recognized the candlestick pattern, saw it had been working well in previous weeks, and applied a mental shortcut of assuming the current market action matched a choice trade setup when it did not. Zoe was affected by her mental blind spot.

Note that little strong emotional responses were involved here. Errors were made due to flaws in thinking; they were not driven as a reaction to fear or greed. She simply jumped to a conclusion without bothering to assess the full range of possibilities that a thorough market analysis would have revealed. Her mind locked onto the candle pattern and, in doing so, precluded any thought of further assessment. This is the representativeness heuristic in action. Had Zoe done the analysis, it would have told her that in this market context, the bullish candle pattern had low odds of working. Again, the base rate or statistical probability for this market context was neglected.

Keep in mind that cognitive heuristics and biases are not mental deficiencies. As we discussed earlier, these mental shortcuts are helpful and useful strategies in day-to-day decision making. They are efficient and usually work well. Because they do work well in many circumstances, we naturally rely on them and we tend to overuse them. Where they don't work well is under conditions of risk and uncertainty—precisely the

characteristics of the trading environment. It is very difficult, however, to shift from something that is unconsciously used all the time to consciously overriding it. This is true for everyone and affects all traders from the novice to the experienced alike.

Intuitive and Deliberative Thinking

To help you understand the pervasive nature of our minds to almost automatically default to an error-prone mental shortcut, consider the two problems below. These questions come from cognitive psychologist Shane Frederick who studies heuristics and biases.[1] Frederick developed an enlightening test on how readily we apply mental shortcuts. Read each question and jot down your answers before reading on. Doing so will help give insight into an important psychological phenomenon highly relevant to your trading:

1. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents
2. If it takes 5 machines to make 5 widgets in 5 minutes, how long would it take 100 machines to make 100 widgets? _____ minutes

Jot down your answers before reading on.

When answering these questions, the majority of people show a characteristic common in many problem-solving and trading errors: they jump to the first answer that comes to mind and spend little if any effort to assess whether or not they have arrived at the correct answer. In the first problem, was your answer 10 cents? Most people give this answer. The correct answer is 5 cents. The most common answer to the second question is 100 minutes, but again, this is incorrect. The correct response is 5 minutes.

In the ball and bat question, if the bat costs $1.00 more than the ball, then the ball could not cost 10 cents because then the bat would have to cost $1.10, which would have a total cost of $1.20. The ball costs 5 cents and the bat, costing $1.00 more than the ball, would have to cost $1.05. Combined, the bat and ball have a total cost of $1.10. In the second problem, since 5 widgets are made in 5 minutes by 5 machines, then it takes each machine 5 minutes to make one widget. Increasing the number of machines to 100 would produce 100 widgets over the same amount of time: 5 minutes. Take a moment to think these through if you need to.

If your answers were incorrect, don't feel badly. Most people answer incorrectly. In fact, when Frederick gave these same problems along with one similar problem to students from some of the most prestigious universities in the United States, including Princeton, Harvard, and the Massachusetts Institute of Technology, fewer than 50 percent solved all three problems correctly. It's less an issue of intelligence than it is an illustration of our natural limitations in thinking through complex problems.

In the research labs, cognitive psychologists Maggie Toplak, Richard West, and Keith Stanovich have shown that answers to Frederick's test are correlated with susceptibility to commit cognitive biases and errors. Incorrect answers on these mental problems indicate that a preference for using heuristics is likely to produce judgment errors when in situations involving uncertainty such as trading. When confronted with mildly challenging problems such as the ball and bat problem or whether or not the market is ripe for a trade, people often don't think deeply enough to arrive at the correct answer. Further, their shallow thinking keeps them from recognizing their error. This leaves them unaware that they are making *avoidable* mistakes. Zoe jumped to a trade decision and was unaware of her error. This has obvious and important relevance to trading.

Assuming you answered the ball and bat and widgets questions incorrectly, pause for a moment and think back to when you were answering the questions (before you knew the correct answers). In the first question, did 10 cents pop into your mind almost immediately? If it did enter your mind quickly, did you simply and almost automatically accept that answer as the correct answer to the problem without any further thought? The same query is relevant to the second question. Did 100 minutes jump into your mind and you felt comfortable with that answer, and so you settled on that? In both cases, once the answers came to you, were you satisfied with those answers and then quickly stopped trying to figure out the solutions? This is the experience of most people. Our minds seem to impulsively go to the erroneous answer and then look no further.

If you did answer the questions correctly, did the incorrect answers of 10 and 100 initially pop into your mind? Most people who do come to the right answers report that they at first came up with the incorrect answers of 10 and 100. The difference between those who solve the problems correctly and the majority who don't is that those who are correct suppress their initial answers and make a greater effort to think through the problem before settling on an answer. Incorrect responders simply accept the first answer that comes to them. This is exactly how heuristics work. Our minds accept the first plausible answer, and then quickly cease further deliberation. This is a mental blind spot. Notably, those who answer incorrectly typically feel that the questions were relatively easy, and it would seem that way because a mental shortcut was used and little energy was expended as they quickly came to an answer. Those who do answer correctly report that effort was required to come to the correct solutions. Maggie Toplak and her colleagues report that correct responders generally acknowledge that the questions were difficult and challenging.

Psychologists such as Daniel Kahneman who study cognition conceptualize our minds as having two parts or thinking systems. Kahneman calls these minds System 1 and System 2. We will be a little more descriptive and distinguish them as *intuitive mind* and *deliberative mind*. For most readers, it was your intuitive mind that came up with the (incorrect) answers of 10 cents and 100 minutes in the bat and ball and widgets problems above. Our intuitive minds are very quick in making judgments. They seem to

operate almost automatically, if not impulsively. As many readers experienced in solving the problems above, little effort is expended when our intuitive minds are activated. We just quickly come to an answer. There is also little or no sense of voluntary control when our intuitive minds are managing our thought processes. It just happens naturally—which in trading with its risk and uncertainty can easily be a mental blind spot.

Our deliberative minds, in contrast, are distinctly different from our quick and impulsive intuitive minds. This part of the mind is active when we are thoughtfully absorbed in a problem or task. Deliberative mind is engaged when we are expending mental effort. Compared to intuitive mind, it works slowly and feels effortful. A sense of concentration, mental exertion, and choice are all associated with deliberative mind and not at all with intuitive mind.

Research by Kahneman and other cognitive scientists shows that intuitive mind automatically and effortlessly activates in response to things like:

- Determining which object is closer than another
- Calculating $2 + 2 =$ ___
- Completing common phrases such as "Curiosity killed the _____"
- Driving along a familiar road.

The response is automatic or nearly so; there is no conscious thinking involved. Contrast this with the level of concentration and effort needed to:

- Listen to a person speaking to you in a loud and noisy room
- Calculate $27 \times 93 =$ ___
- Drive an unfamiliar road with many turns
- Prepare a trading plan.

These mental tasks require mental deliberation and demand attention, sustained concentration, thought, and conscious reflection—all characteristics of deliberative mind.

You can see that intuitive mind is quick and essentially automatic in its response; it requires little thinking to come up with an answer. Deliberative mind is slow. Answers require effort and concentration. Intuitive mind activates with seeming ease, in part because we are born with certain perceptual abilities such as orienting to sudden sounds, recognizing objects, and avoiding threats. We can also become quick due to repeated practice (e.g., riding a bicycle or driving a car), and through prolonged exposure to cultural norms, social situations, and language such that we automatically know how to act in most social situations and can associate words with symbols and ideas and immediately understand what they mean, even if we haven't encountered them before. In trading, if we have studied chart patterns for a period of time, for example, it is our intuitive mind that quickly identifies a bull flag pattern.

However, it requires our deliberative mind to engage in the analysis as to whether or not that bull flag is in the right market context for a trade.

So why all this discussion about our two types of minds? Well, it turns out that understanding this two-part feature of our mind is vitally important for trading. Intuitive mind, quick and efficient, is exceptionally poor at determining probabilities, a key skill in trading. If it identifies a bull flag, it tells us to trade it. You might think then that our deliberative mind—which is good at assessing probabilities—would step in and curb the actions of intuitive mind. Not true. At best, our minds like to conserve energy and will employ deliberative mind only when necessary. At worst (and I tend to believe it is the worst), deliberative mind is lazy. This is Daniel Kahneman's considered view. Thinking is hard work, and at some level thinking is experienced by many as aversive. If there is a ready answer offered up by intuitive mind and the answer seems plausible, then the research shows that deliberative mind will tend to rely solely on intuitive mind and not question it. It takes the easy way out and avoids the uncomfortable experience of thinking hard. Think back to the widgets and bat and ball problems. Both of those tasks required the skills and abilities of deliberative mind, yet the vast majority of us give quick, intuitive answers without any serious consideration as to whether they were correct or not. In other words, in these tasks, deliberative mind simply accepted what intuitive mind told it, no further questions asked. Do you see how this characteristic of our mind can work against us in trading? Let's look at another case example and further our thought on this matter.

Case Example: Nathan

Nathan has developed reliable technical skills during the two years he has been a trader, but his results remain inconsistent. We'll take a look at one of Nathan's trading days, starting with his game plan for the day, a trade he took, and how his thinking—which included his misuse of the representativeness heuristic and his uncritical acceptance of what his intuitive mind told him in the heat of trading—caused trouble.

Each night, Nathan develops his game plan for the next day's trading. For this day, he saw from Figure 1.3 that both his higher time frame charts showed that the 10-Year U.S. Treasury futures market was weak. The daily chart had turned down at trend line resistance and the intraday chart was already in a downtrend. He decided that his game plan for the next day would be to sell the market short in the area marked E along the higher time frame intraday trend line at the right edge of the chart.

Early the next day, Nathan saw from Figure 1.4 that the market had made a new low at A, dipped under that low at B, and then held. After the market rallied to C, Nathan decided to go long at D. His thinking was that the selling had dried up at

FIGURE 1.3 Higher Time Frames Show Weakness in 10-Year U.S. Treasury Futures
Source: TradeStation Technologies, Inc.

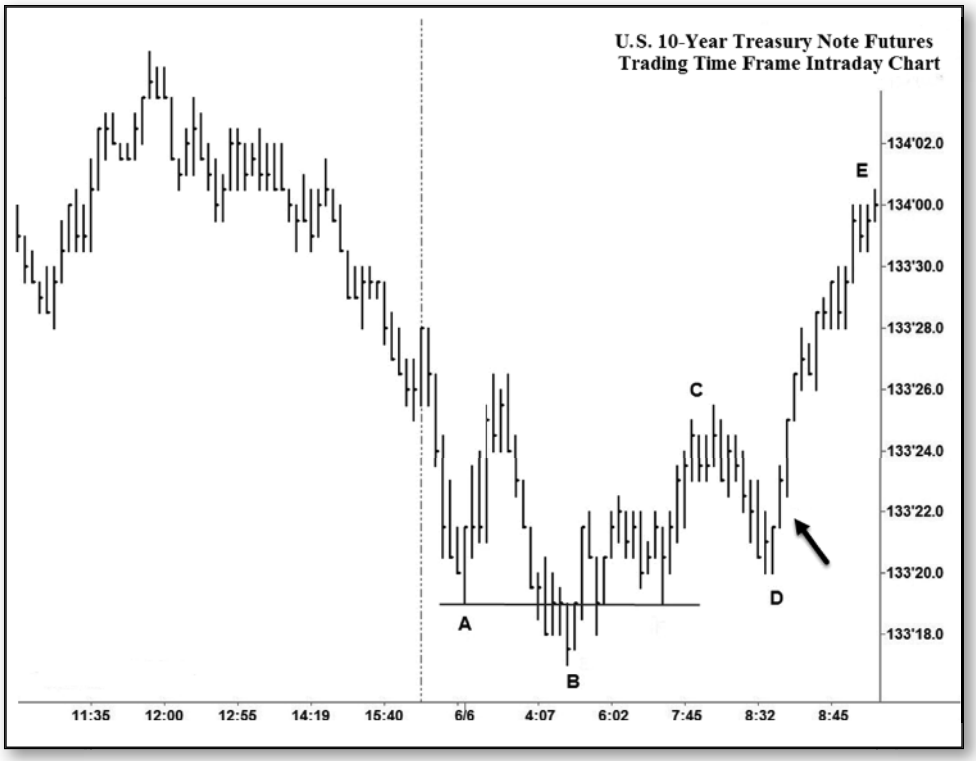

FIGURE 1.4 Nathan's Long Trade
Source: TradeStation Technologies, Inc.

this level, at least for the moment, and the market was showing some strength that morning. At D he told himself, "If the market begins to rally from here, I will go long." It did start to rally and he went long (at the arrow). The market then moved briskly higher.

His trade was a profitable one, and Nathan was happy. But then he ran into trouble. In his mind, the market had a strong response from holding the lows at A and B. "Clearly, there was aggressive buying on the rally [from D to E]. The market is very strong," he thought. Nathan decided to hold the trade. But holding the long trade was a poor decision. Figure 1.5 shows what happened. The profit made on his long trade was wiped out as the market quickly erased the morning rally.

How did this happen? Nathan explained it later that evening. "I was thinking at the time that it would be premature to exit such a good trade. I thought, 'Hey, I'm in a great trade and I don't want to cut a winning trade short.' I was feeling very good about my trade and I thought holding it was the right thing to do. I thought the market was obviously bullish and I should hold on."

FIGURE 1.5 Nathan's Loss Due to Representativeness
Source: TradeStation Technologies, Inc.

Nathan applied the representativeness heuristic, which led him to believe that the market was "obviously" bullish. Nathan jumped to the conclusion that the up move resembled strongly bullish behavior when, in reality, the market was not bullish. Similar to Zoe's candlestick pattern, mere bullish appearance does not necessarily mean the market is going higher. Nathan's intuitive mind mentally locked into the morning rally and its impression of strength. He was operating within a mental blind spot. Without further thought, he replaced his thorough nightly analysis with the easy question of: Did the market look bullish? Drawn to the salience of the morning rally, his intuitive mind was unable to detect that this was a mere façade in the larger downtrend. Although the base rate probability favored further downside movement, Nathan—as is typical with representativeness—took no notice of what was probable.

You might be asking how could this happen? After all, Nathan had developed a game plan to sell the market at E. How did that get ignored? Recall again the bat and ball and widgets problems above. Remember how quickly your mind came to the incorrect answer, and also, how swiftly and uncritically it was accepted? This is how our minds tend to operate when caught in a mental blind spot. Our intuitive mind swiftly develops a seemingly reasonable answer to a problem and our deliberative mind, rather than engaging in the effortful task of thinking through the problem, simply accepts what intuitive mind offers.

You might even say that there is a little mental sleight-of-hand being done by the mind. Intuitive mind can't really grapple with a question as complex as the probabilities of market direction. Deliberative mind is equipped to deal with the complexity

of probabilities, but this is an involved question that takes mental effort to resolve. Instead of dealing with the difficult question, it gets replaced with a comparatively easy question, which then gets answered. According to Daniel Kahneman, this is a typical way intuitive mind operates. Nathan's intuitive mind asked, "Has the market rallied, moved up, and is it looking bullish?" The answer, of course, was yes. It did rally, price moved higher, and it did resemble bullishness. This made it easy for Nathan to believe that the market was bullish and led him to hold onto his long position. However, the more complex and appropriate question was, "Given the current position of the market, what is the probable direction of the market's next move?" That, of course, is a much more involved question requiring the use of Nathan's deliberative mind. Notice that this question was never asked; only the undemanding question, "Does the market look bullish?" was considered.

It may seem surprising that Nathan forgot all the work he had done the night before when he developed his game plan. He was interested in selling the market short at E. His deliberative mind worked this out after detailed consideration of the higher time frames, recent intraday trending, and other relevant market factors. This was a meticulous and thorough assessment that addressed the question of what the next probable move in the market would be and where it would likely take place. Rather than taking his long trade off at E and initiating the short position as he had planned, however, Nathan held onto his long. He committed a cognitive error and profit was returned to the market. Further, he forfeited all the profits he would have realized had he followed his plan to short at E because his intuitive mind took over. The quick rally stood out prominently, and in a very real sense, this one salient feature of market action captured his mind. We could say his mind was hijacked as he completely neglected his game plan and the short opportunity that had set up—a costly cognitive error!

Although Nathan recognized the weakness in his nightly analysis and also understood that a downtrending market will often see technical rallies, his intuitive mind simply and solely relied on the representativeness of the morning rally, ignoring the work he had done the night before. Kahneman refers to this as WYSIATI—What You See Is All There Is. It is a shorthand way of saying that the intuitive mind will focus on only a small, selective amount of information and confidently come to a decision. The information it considers is often incomplete, but it is nevertheless viewed as the only information relevant from which a judgment is then made. What is presently before the intuitive mind is all there is. Other important data—even highly relevant data like the detailed work done the night before—can be disregarded or unnoticed. Out of sight, out of mind.

Your intuitive mind has no difficulty stepping right up and voicing its judgment based on what it sees. This produces errors because this part of our mind is limited in what it can do. Trading decisions require a synthesizing of various pieces of market information that often are contradictory. And, trading decisions always involve

probabilities. Intuitive mind cannot synthesize data or deal with probabilities. This type of thinking is the province of deliberative mind. But as Nathan experienced, deliberative mind is difficult to engage and it often acquiesces to intuitive judgments.

Nathan's mind was also highly influenced by other psychological factors. Once again, the recency effect showed its hand here. The most recent bullish price action was emphasized over both the fact that rallies tend to end quickly in a downtrend and the fact that price was coming to a known supply level. Also, Nathan's euphoric feelings in making a good trade decision early in the day producing quick profit overshadowed his perception of reality. He felt delighted and even a little triumphant that he had just called the market correctly and was in profit. When we feel good about something, we tend to let down our guard. At these times, intuitive mind is especially free to reign. We aren't as critical or as analytical as when our mood is neutral or slightly negative. When feeling upbeat, we tend to expect positive results to continue. This is known as the *affect heuristic*, and it was evident in Nathan's decision to "let the trade run."

The representativeness heuristic and its associated biases are very common in traders. In every case, the trader misreads the features of the market as something authentic when it is not. This occurs because an easy task is substituted for a more difficult one. As we have seen in the case examples, in trading this often involves identifying a chart pattern, indicator, or price action as all that is necessary to make a trading decision because it resembles a prototype when a more deliberate analysis is needed. At the same time, what is most probable for the market—that is, the base rate—is neglected. Selected data that is usually conspicuous precludes other relevant data from consideration (WYSIATI) and recent events can be more heavily weighted in our decision making than is warranted. And, when things are going well and we feel good, we may let our vigilance slide, something we don't want to do when trading the markets.

Representativeness can arise in nonobvious ways. Michael Cooper, professor at the University of Utah, Eccles School of Business, has done some fascinating studies on representativeness. For example, during the frothy bull market leading into the twenty-first century, the Internet was new and exciting. Cooper and his colleagues show that companies that announced name changes during this period by adding "dot-com" to their corporate monikers saw their stock price outpace other stocks by a striking margin. Traders and investors apparently believed that the mere name of a stock was representative of sound management, a strong market share, sufficient capitalization, excellence in business planning, and a profitable and enduring line of products or services. Interestingly, Cooper continued this line of research after the dot-com stock market bubble burst. His research team looked at stocks that then removed dot-com from their names and found exceptionally high returns during the two-month period after the name change, showing again how representativeness can easily influence investor and trader behavior.

More Heuristics and Cognitive Biases

The representativeness heuristic is likely the most prevalent heuristic used by traders. There are many other heuristics and cognitive biases that have been identified by psychologists. Wikipedia, for example, lists over ninety biases related to judgment and decision making (there are also biases that operate specifically in social situations and others that are relevant in memory recall). You could drive yourself crazy if you tried to learn all of the biases and heuristics psychologists have discovered. Fortunately, for trading this isn't necessary. It is important, however, that you understand the more common ones and how they can undermine your trading. I highlight the ones most relevant to trading here with a few reserved for coverage in later chapters.

Confirmation Bias

Once an assumption is made, people tend to seek confirmation of their assumption, rather than look to disprove it. Thus, instead of looking for contradictory data—information that would call into question a trading hypothesis, for example, we have a natural tendency to seek out and overweight data that would be consistent with and supportive of our view. We have a strong need to be right and tend to look to confirm what we already know or believe. This is known as *confirmation bias*; it can be an important source of difficulty in trading.

A technical trader who uses the Stochastic Index as a major indicator to assess overbought/oversold conditions when considering taking a trade would be applying confirmation bias when she decides to also check the Commodity Channel Index, "just to be sure." Both indices measure essentially similar characteristics in price action and give the trader the same information. Not only is the trader basing her decision on methods that are correlated, she could fall into the trap of thinking that since both indicators are signaling, there is greater strength to the signal and it must, therefore, be a very good trade. This may promote unwarranted overconfidence and lead to unjustifiable actions such as increasing trade size or staying with a trade too long—two potentially costly judgment errors.

Focusing only on confirming data can also lead to greater than planned losses when in a trade and market action contradicts the position. In this common instance, the trader remains blind to the threat of loss because he continues to focus on and overestimate the indications that endorse keeping the trade. Thus, things like minor price action that, in isolation, appear positive to the trade are over weighted and used to confirm the original trade idea now under water. Significant negative price action that has emerged since the trade was taken is overlooked or ignored. In these instances, trades end by stops, if placed, rather than by an early exit prompted by objective assessment of the unfolding market. What is often the case when confirmation bias is present, however, is that stops are not placed and the trade exit occurs

when the positive features of the trade are completely shredded and further pain of loss becomes too great to bear.

Legendary trader George Soros has commented that a trader's ability to sift through the data and search for disconfirming information is behavior that is rational and profitable. Searching for disconfirming data, however, is not common. It runs counter to our nature. Edward Russo and Paul Schoemaker, experts in judgment and decision making, suggest that confirmation bias acts as a type of psychological reinforcement. When we find confirming indications, it says we are right, and this strokes the ego; we feel good. You can see how intuitive mind would favor data that provides a quick and easy confirmation of a trade idea or market bias. Attaching the emotional reinforcement of being right makes it difficult to rise above this bias. Seeking, finding, and accepting disconfirming evidence is saying we are wrong. This is not natural for most of us. It also requires the active engagement of deliberative mind, which we have already experienced is not easy to do. No wonder Soros categorizes the ability to search for disconfirming information as rare.

The Recency Effect

We discussed the recency effect earlier. Because it can be so influential in trading, however, it is worth expanding our discussion of the recency effect. Recency bias occurs from our tendency to weigh the latest events more heavily than other data points even though other data may be equally or more important. What just happened lingers fresh in our minds and, thus, is more memorable than what occurred earlier. Mentally assigning more weight to recent events consequently influences our expectations of what will happen in the future.

Recency bias can affect trader behavior in a number of ways. As we saw with Nathan, traders can be susceptible to weighing recent market movement most heavily in their prediction of how the market will unfold in the future. Similarly, as we saw with Zoe, if a trade setup has just produced a successful trade and sets up again, a trader is likely to have greater confidence in the setup—more than its statistical track record would warrant. In contrast, if a trade setup has just produced a losing trade, many traders find it difficult to enter that setup again, especially when it sets up soon after the loss. Colin passed on such a trade setup.

In both winning and losing trades, the trader's mind can be overly influenced by the recent experience. It is as if the trader is thinking that the recent outcome of Trade A will directly affect the outcome of future Trade B. We know, or should know, that this isn't true. Each trade is independent of every other trade. Trade A does not influence Trade B, yet we act as if there is a relationship because of this cognitive error. Trader behavior becomes a function of the recency effect—a mental blind spot.

When first looking at a chart, the eyes of novice traders (and even many experienced traders) will rivet on the chart's right edge. They see the last few price bars

and are quick to make a judgment about future market direction based on this limited information. The intuitive mind likes this approach. A few data points are selected, they are rapidly evaluated, and a decision is made. But this is also weighing the most recent market action as the only thing that matters in making a trading assessment. Without taking into account other background conditions and overall market context, the trader runs the real risk of making a trading decision based on random information. The recency effect has us neglecting market context and background data. What we pay attention to is determined by its newness, not by its relevance.

It's not just the recent things outside of ourselves like the market or our trade setups that we overweight, we can also overweight our trading performance. If we are trading well and string a few successful trades in a row or have an outsized gain, we run the risk of allowing this recent experience to influence our next trading actions. The tendency is to think we are on a hot streak or somehow our skills and abilities have rapidly improved or we are just reading the market better than others. This puts us at risk of committing several unforced trading errors such as increasing position size, overtrading, or entering marginally qualified trades. The affect heuristic—lowering our guard because we feel good—can reinforce and amplify recent positive performance. Overweighting recent performance can influence our current attitude and behavior, often leading us to act outside the bounds of our trading plan or, more generally, act outside the bounds of rational trading.

And, it's not just winning performances that can get overweighed; traders just as readily overweight poor performances, too. Recent poor performance can lead a trader to withdraw from the market in order to avoid the expectation of further poor performance, or they may do the opposite and double down with increased position size or take on additional trades in an effort to recoup what had been lost. Either way, the important point is that recent events or actions are judged as overly important and directly influence our next actions. This often leads to erratic trading behavior and increases the odds of committing unforced trading errors and producing unnecessary losses.

Hindsight Bias

Looking back is always with 20-20 vision. *Hindsight bias* is sometimes called the "I-knew-it-all-along effect," suggesting that people view events after they happened as more predictable than they were before they occurred. The benefit of now having the data influences how they recollect their initial view of the event. Judgment and decision-making researchers Neal Roese and Kathleen Vohs note in a review of the scientific literature of this well-studied mental blind spot that hindsight bias involves three levels of cognitive error: (1) flawed memories of one's earlier opinion or forecast making it seem as if the person predicted the outcome when, in reality, they did not predict it; (2) belief that the outcome was certain to happen and had to happen

in the way that it did; and (3) that the outcome was foreseeable and knowable ahead of time.

In succumbing to hindsight bias, we tend to selectively recall only certain information that validates what we now know to be true and then create a story about it to make sense out of the event as we attempt to explain it to ourselves. If this story is relatively easy to construct it then seems that this is the way it had to occur and, therefore, the outcome must have been foreseeable. Again, as we have seen earlier with other cognitive errors, only certain, selected information is considered and our mind looks to take the easy route and substitute a story about the event that now seems persuasive rather than carefully considering all the available data and working through that data methodically to understand why the event occurred.

We often look at a market and will be able to make arguments why it might rally and also why it might react. Ambiguity is a frequent part of the trading game. When the market rallies, traders affected by hindsight bias will look back with seeming 20-20 vision. They will mentally set aside the ambiguity they experienced at the time, selectively cull information that supported the rally, and weave together a story of market bullishness, with thoughts and feelings that say, "I knew it all along."

Two significant consequences can arise from hindsight bias, as described by Roese and Vohs. The first is that hindsight bias can stimulate feelings of regret. Almost always, regret will be accompanied by thoughts of "I should have seen X" or "I could have done Y." If the trader is now thinking because of hindsight bias that they *should* have caught a strong move, they risk feeling bad that they missed profits. Worse, they may try to make up for it by now taking a marginal trade because they feel a self-imposed pressure from a faulty mental appraisal of what occurred.

The second major consequence of hindsight bias is that it prevents learning. As Roese and Vohs note, "If you feel like you knew it all along, it means you won't stop to examine why something really happened." For traders wanting to develop mastery and expertise, this is a significant roadblock to self-improvement and self-development. If we think the reasons a market moved were obvious, we won't bother spending the mental effort to review and study the move to understand why it occurred the way it did. This false belief can undermine our skills and abilities as traders. When a similar event reoccurs in the future, we are unprepared and likely misinformed. This, of course, can continue to adversely affect our trading.

Endowment Effect

A private stock investor acquired a long position in Apple, Inc. at an average price of about $350 per share. His personal research projected a target share price estimate of $750, based on what he thought revenue, profits, and other considerations would be in the near future. He was also enthralled with Apple's iPhone and iPad, and

bought the latest versions. In September 2012, AAPL reached an all-time share price high of $705 before falling precipitously. This investor was also technically savvy and could see that the stock had become parabolic on the run up to new highs—an excellent technical reason to close at least a portion of the trade, if not all of it. This investor chose to hold his trade, however, despite the fact that he had doubled his investment and the technicals indicated it was now overbought. He said, "This stock will go to $750 or higher. I am not selling it for anything less." AAPL fell below $425. A year later the investor was still holding the position and still waiting for a $750 share price. This is an example of the endowment effect, another mental blind spot in which traders can become ensnared.

This cognitive bias is the opposite of cutting a winning trade short. Traders influenced by the endowment effect overvalue the stock, commodity futures, or currency contract that they already own, seeking a significantly higher price than if they did not own it and often a price well beyond fair market value. Mere ownership affects perceived value. They will become more emotionally attached the more they think about the things they like about it. Thinking about how much you like the Apple products (e.g., iPhone, iPad, Mac) and their features, for example, would tend to enhance the endowment effect. Thinking objectively about the stock (e.g., P/E ratio, earnings growth, price-to-book, technical condition) will help to minimize it.

As science becomes more advanced, we are learning that some mental blind spots are a part of our genetic make-up. Endowment offers a good example. Evolution has made us sensitive to scarcity, making us reluctant to give up what we already have, as there is risk in not having the object in the future when it might be needed. A team of scientists, led by Stamford professor of psychology and neuroscience Brian Knutson, has shown that a specific brain area, the anterior insula, will activate when vulnerable to the endowment effect. This brain region is associated with physical pain and the emotion of disgust, emphasizing that it is painful to give up or lose something of value. Consequently, we assign a higher value to it.

Turning a losing day trade into a long-term trade can begin with the endowment effect when the trader is unwilling to sell out because she believes it has greater value. When it doesn't meet the desired price level and the belief of higher value imprisons the trader's mind, the trader may continue to hold the position turning it into a longer-term trade.

What Traders Can Do

We include in this chapter short case examples from Colin, Zoe, and Nathan. Each committed unforced mental errors that led to poor trading actions and results. Each trader believed they were making correct decisions as they made them. The

judgment mistakes made were costly. Each trader did not understand why they made the mistake they made. The three case examples reflect the experience of many traders.

It is very easy to make cognitive errors in trading. At the time they are being made, we are usually unaware that we are making them. Again, this is due to the ease and efficiency cognitive shortcuts bring in everyday life. What works in familiar situations is naturally brought into the trading environment, but trading is the kind of environment in which they are most likely to fail. The trader is then left wondering why. Cognitive shortcuts (heuristics) are natural mental blind spots that reveal themselves in the thinking traps and mental shortcuts discussed in this chapter. These are as much a part of trading psychology as emotions. As we will learn, trading psychology is more about understanding how our minds tend to work than controlling emotions. That is why I introduce this topic at the beginning of the book: to help traders of all levels begin to recognize that our thinking—and not just our emotions—is a vital aspect of successful trading. Understanding how our minds work may be more important to the more experienced trader who struggles less with emotions yet still finds consistency elusive. For the novice trader, understanding these blind spots and working to overcome them will help keep errors down. This along with development of other trading skills can build confidence and relieve the aspiring trader from some of the toxic emotional pitfalls that so many traders have experienced and suffered. Knowing and understanding the mental blind spots is the first step toward dealing with them. We conclude this chapter with some suggestions on steps traders can take to address their mental blind spots.

Because cognitive biases are mental blind spots, it takes special effort to avoid falling into their traps. Often, we realize our errors after the fact and it is too late. One important tool in making sound decisions is developing the mental skill of mindfulness. We discuss mindfulness in detail in later sections of this book, so I touch on it only briefly here. Mindfulness will help keep the trader centered and focused on the process of trading, which will significantly help her or him be aware of the decisions being made as they are being made and help avoid the mental blind spots discussed here. When we employ heuristics and other biases, we override the trading process in favor of mental shortcuts that provide mental effortlessness. Engaging deliberative mind takes work, and often we find ourselves accepting intuitive solutions to avoid the mental calculus needed to make carefully considered decisions. Mindfulness cultivates a mental space that can help us choose to expend the right effort rather than accept a beeline to a trading error.

In judgment situations where representativeness commonly appears—as in trading, Wesleyan University psychologist Scott Plous encourages decision makers to keep base rates firmly in mind. Many of the cognitive errors we can make in trading relate to ignoring statistics. In this regard, it is wise to know your personal metrics for all of your individual trade setups. This would include basic win-loss ratios as well

as expectancy for each setup. Having these statistics at hand will help you avoid making important trading decisions based on one or two salient features of the market and remind you that each trade has a set of odds. Understanding trade setup base rates is useful in rising above representativeness and other biases, including the recency effect. If you are feeling reluctant to take a trade because you have had three losing trade events in a row, knowing that your trade setup has a win rate of 65 percent can help you remember that you are trading the setup's odds, and what it did the last time you took it is within the norms of its base rate and not a reason to avoid trading it when it next shows up.

Also important is to have a well-defined trade setup that includes the market conditions under which the trade works best. This will not only serve to remind you to pay attention to crucial background elements, it will also serve to filter your trade setups so that you take only those with the best background conditions for that setup. In this regard, you verify for yourself that you are taking only the choicest trades. This kind of qualifying criterion will not only help you avoid decision-making errors in trade selection, but it will also serve to increase your trade setup odds and expectancies.

To avoid distortion and bias in what you see in the charts, Russo and Schoemaker recommend that you deliberately ask appropriate disconfirming questions. This is useful for any cognitive bias and it is especially helpful in counterbalancing our strong tendency toward confirmation bias. For example, if the market is rallying and demand or buyers seem to be in control and you are looking for a long trade, it would be prudent to also ask yourself about supply. You might ask, for example, whether the last pullback showed lighter volume and narrower price bar ranges than the last rally and whether your key indicators are maintaining a bullish tone as the market pulls back. You are looking to disconfirm the presence of strong selling as you are about to take a long trade. When the market pulls back on light volume and lower overall activity and indicators fail to bend down, it shows supply is not dominant.

You can also test the alternative trade to the one you wish to take. Staying with the long trade example, you would look for evidence that a short trade was in order. You weigh this analysis against the analysis done for the long trade and assess which is the more compelling choice. At the very least if you are thorough and objective, you will identify anything overlooked. You will know whether your trade is a choice opportunity or not. This can be useful in more ambiguous trading situations and will also be of help with hindsight bias. It will pay you great dividends to develop a standard set of disconfirming questions for each trade setup you can routinely ask or by assessing its alternative before taking any trade. By doing one or both, you are not only actively working against confirmation bias; you are also actively engaging your deliberative mind.

Traders who use mathematic indicators in their analysis are well-advised to avoid auto-correlation. Multiple indicators can be useful, but not when they all measure

the same thing. Make sure that the indicators that you do use are tapping into different market dimensions; otherwise you are committing confirmation bias. John Bollinger in his book, *Bollinger on Bollinger Bands*, provides a thorough discussion on multicolinearity among technical indicators and how to avoid it.

Paying attention to base rates, being clear on the best overall market conditions for your trades, and asking disconfirming questions or conducting alternative trade analyses are all designed to help sidestep the minefield of cognitive errors that our minds seem so willing to enter. Table 1.1 summarizes the cognitive errors covered in this chapter and some suggested tactics to counter their effects. The idea is to recognize that thinking errors are likely to occur in trading, to hold yourself back from accepting the first idea that comes to mind, and take specific steps to engage

TABLE 1.1 Common Cognitive Heuristics and Biases: Descriptions and Suggestions

Heuristic/Bias	Description	Suggestions
Representativeness Heuristic	Assuming an event is an accurate representation of a class (e.g., assuming a chart pattern represents a true directional play). Especially common in trading.	Pay close attention to the base rate of a trade setup. Be aware of the overall market context. Engage your deliberative mind before coming to a conclusion.
Recency Effect	Disproportionate overweighting of recent trading patterns or events and expecting them to continue into the future.	Make a special effort to look beyond recent events.
Affect Heuristic	Positive feelings promoting incautious and careless trading.	Use optimistic emotions as a signal to step back and engage deliberative mind.
Confirmation Bias	Using additional similar or comparable information to validate a preconceived trading action or idea.	Actively look for contrary indications and weigh against confirming indications.
Base Rate Neglect	Tendency to ignore trade probabilities in favor of representativeness, recency, salient features, and other nonprobabilistic reasoning.	Keep good records of all trades and generate individual metrics for each setup.
Hindsight Bias	Tendency to see past events as predictable.	Qualify trades and events by an objective assessment of features and attributes. Seek to understand why a market event happened.
Endowment Effect	Tendency to overvalue what is already owned. Focusing on associated features can amplify perceived value.	Pay attention to objective assessment data. Have objective profit target.

your deliberative mind. This is much easier said than done. All too often our intuitive mind presents what appears to be an attractive solution, does so effortlessly, and, without really being aware of it, we willingly (and confidently) accept the easy solution. Even Daniel Kahneman—perhaps *the* world's expert in this field—finds it difficult to avoid the cognitive illusions and traps that he has studied, researched, and defined for 40 years!

The best antidote to reduce judgment errors due to cognitive heuristics and biases according to Daniel Kahneman and his colleague Gary Klein is through the development of expertise. Even traders who are true masters and appear to rely on highly refined intuition in reading the markets and making trades are applying hard-won trading and chart-reading skills. The more skilled one becomes at reading markets and managing trades under varying market conditions, the fewer the trading errors due to heuristics and biases, and, of course, the better the trading results. This requires a protracted period of experience in which special forms of practice are carried out with clear, immediate feedback on performance. For a technical trader, this means a lengthy period of training through simulation or paper trading and a gradual immersion into actual trading so that trading knowledge, skills, and abilities are acquired, developed, and consolidated. In Part 3 of this book, we cover a proven approach for personal development and improvement as a trader, and in Chapter 11 we examine how expertise and mastery is developed through the psychological science of deliberate practice and how to specifically apply it to your training and expert skill acquisition and development.

Note

1. Shane Frederick, "Cognitive Reflection and Decision Making," *Journal of Economic Perspectives 19* (2005): 27.