

## Perception, Duration, and Deductions of Price Patterns

It is time, as an aspect of behavioral economics, to address the role of perception in markets.

The problem of perception remains as cogent and unresolved for present-day philosophers and psychologists as it was for the ancient seers. All of the data, financial or otherwise, that we receive or feed on comes to us through our senses. If there is an object in front of us, we sense it through our eyes. If there is a sound or a spoken word, we sense it through our ears. These sensations enter into us in a process called perception. This perception process continues into our brain where it is further modified by our thinking. This mental processing creates a personalized interpretation of our original sensation. In short, the objects that we sense through the process of perception are translated into subjective conclusions. This is why different people may actually see or hear the same situations quite differently. This question of perception and interpretation is at the heart of behavioral finance. Perception is also a central feature of psychology. Behavioral finance is, in fact, the specific area in which economics is trying to assimilate the reality of psychology in economic life. The activity of the market is an

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objective metrical entity, which again, through perception, is rendered into subjective interpretations. While it may not be possible to absolutely perceive the market, we can investigate the grossest illusions that represent the misperception of the market. Price histories, charts, fundamentals, and investor expectations are all perceptual issues. Perception, then, is at the core of an optimized behavioral finance.

### The Way We See It

As we accept the fact of irrationality in markets, we also have to admit that market participants all have some degree of bias. Put it any way you like, we see what we want to see, or allow ourselves to see. It is as if we have several pairs of spectacles that provide predetermined scenes or scenarios. These virtual lenses are how we see or how we frame a situation. This framing aspect is, of course, the primary insight of the prospect theory of Daniel Kahnemann and Amos Tversky, both of whom recognized the inescapable subjective bias inherent in economic choice. This same framing or personalized psychological perspective is also the central thesis of schema therapy. Behavioral finance is where economics, psychology, and markets meet.

### The Ice Man Returneth

In 1991, a frozen corpse was discovered in the Alpine border region between Austria and Italy. He was called the “iceman.” Still frozen, the iceman was taken to Austria where scientists at the University of Innsbruck studied the corpse until 1998. After extensive examination, the experts concluded that the iceman had died as a result of what they believed were three broken ribs. Their conclusion was based on a deformity of the ribs apparent in both the X-ray and CAT-scan images. But he was not to rest in peace. It was later determined that he was actually found 100 yards inside the Italian border. The Italians wanted him back badly and in 1998 he was returned to Italy where new X-rays were taken. Scientists at General Regional Hospital in Bolzano, Italy, revealed that the iceman had a flint arrowhead lodged in his left shoulder. This finding shocked the other scientists and archeologists who had been puzzling over the iceman’s death for nearly a decade. In newspaper photos the arrowhead is plainly visible. The arrowhead is obvious

and the explanation for his demise is obvious as well. It was there all the time but the original researchers just didn't see it.

## Ground Truth

When geographers make maps they use a two-step process. First, they take aerial photographs. Then they actually visit the territory to insure that the images have properly depicted the earth's contours. This confirmation or further resolution of the virtual mapmaking is called the "ground truth." In order to assess a situation, we must not rely only on a conceptual picture, but also investigate what the actual source can tell us. Of course any new discoveries that the ground truth provides may necessitate a reworking of the entire map. Direct perception often necessitates an adjustment to our preconceptions. The map is not the territory. We may see the Tora Bora region of Afghanistan in the atlas, but do we understand its geography? Landsat satellite imagery knows Tora Bora and the tribal chiefs of the area know Tora Bora, too. These three perceptions all represent different kinds of knowledge. If you were lost in Tora Bora, whose knowledge would be the most useful? As shown by the German filmmaker Harun Farocki in "Images of the World and the Inscription of War," World War II aerial reconnaissance of the IG Farben chemical plant in Poland also showed the Auschwitz concentration camp that was right next to it. It was clearly there to see but it was not seen.

## The Obvious Illusion Revealed Once Again

Adherents of behavioral finance have devoted much attention to discovering what they call cognitive errors. The eponymous example of such an error is illustrated in the classic illusion first laid out in 1889 by Franz Muller-Lyer, a version of which is reproduced below in Diagram 10-1. This perceptual or optical illusion is also thought to typify how human beings make obvious errors. When we look at the left-hand side of the diagram, it appears that the line on the top with the arrows pointing inwards is longer than the line below it with the arrows pointing outwards. The illusion is revealed or made transparent when the two lines are enclosed in a rectangle as shown in the right-hand diagram. This much-used and simple illusion has wide ranging references as well as

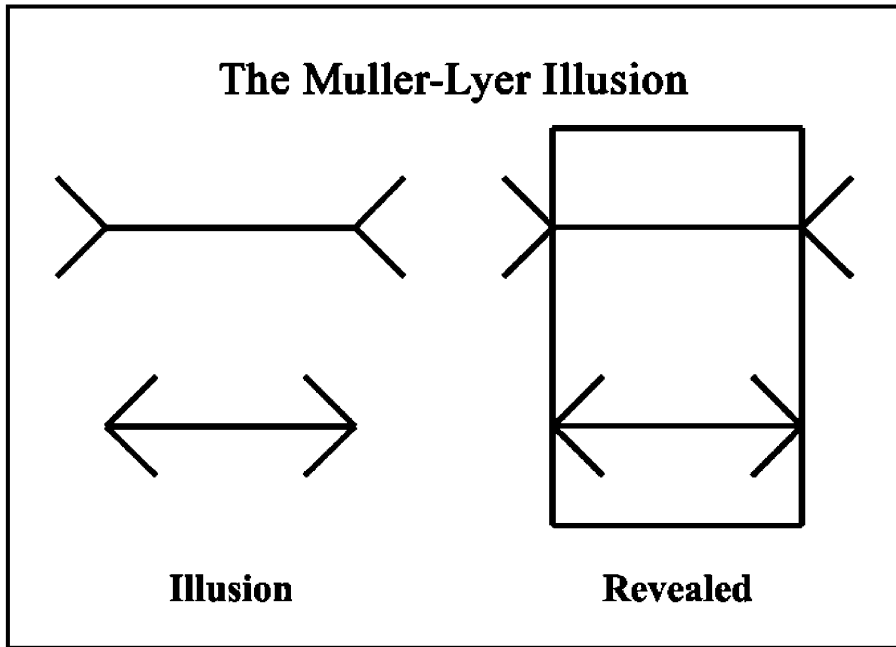


DIAGRAM 10-1 The Muller-Lyer Illusion

wide-ranging implications. Because behavioral pioneers Kahnemann and Tversky used this diagram to illustrate their seminal idea of framing, this illusion has become the standard example for errors of cognition.

### Looks Random, Seems Random, So It Must Be Random?

There is another classic diagram, which belongs to the opposing economic side. The rational school of economists who postulated efficient markets assumed stock prices were random. Harry C. Roberts presented one of the earliest renderings of randomness in stocks in 1959. Of course the simplest way to prove randomness in stocks is to discredit anyone who postulates patterns in stocks. The unlucky “patternists” in this case were the technical analysts and their most famous pattern was the “head and shoulders.” Roberts’s paper compared real stock prices with what we might call virtual stock prices. His virtual graphs were constructed of data obtained from a random number generator. The original graphs are reproduced in diagram 10-2.<sup>71</sup> His assertion, or per-

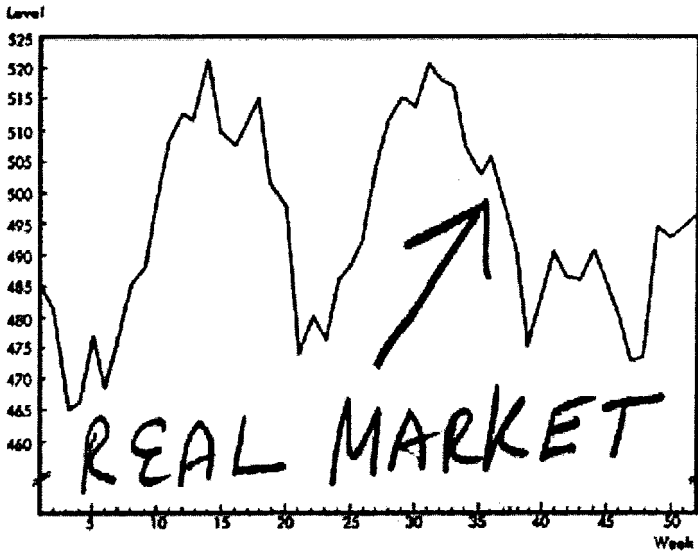
haps his assumption, is that because the real and the virtual stock chart have the “same visual appearance,” stock prices are random. Because random numbers generated a seeming head and shoulders pattern, such patterns are illusions and technical analysts are deluded. Some have suggested that this is a compelling parallel to the Muller-Lyer illusion. Solt and Statman, in their 1988 paper, “How Useful Is the Sentiment Index?” suggest that “the ‘head and shoulders’ graph is a nontransparent presentation of randomness. The graph seems to show a pattern, but in fact a pattern does not exist.”<sup>72</sup> This may be a dubious logic. After all, if you showed a physician an EKG graph generated from random numbers and he gave you a diagnosis, does it prove that the patterns in all the real EKG data are random or did you just put one over on the good doctor? Could it be that the cognitive error is on the part of those who are culturally biased against patterns whether in technical analysis, chaos, or whatever.

In any case, many of the top investors in the world do pay attention to such technical patterns. It isn't the patterns themselves that matter, it is what the patterns represent in terms of the behavioral market condition. Technical patterns are just like road signs pointing out the potential for a slippery surface that may be coming around the bend. Head and shoulders patterns are a poor man's pattern recognition because they are both so rare and so trite.

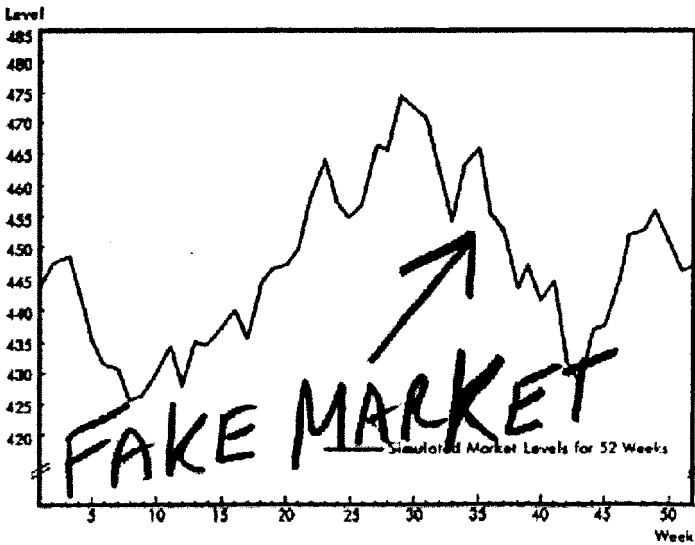
### The Challenge of Chartism

Price charts only tell us what we think they tell us. Our bias interferes with the potential for an objective perception of a given price history. We see only what we have been taught to see. One may say the same thing about fundamentals. Fundamentals are perceptual, too. The terrible news of the bankruptcy of WorldCom and generally failing communications companies were negative fundamentals for the telecom sector. Yet, some would say that these bankruptcies have finally created value in telecom shares, which had been overvalued for years. The return to realism and the reduction of expectations to reasonable growth may actually provide the best fundamentals in years. Who sees what? Those with a perpetually bullish bias are victims of the adage that beauty is in the eye of the buy-and-holder.

### Actual and Simulated Stock Prices



Friday closing levels, December 30, 1955–December 28, 1956. Dow Jones Industrial Average



Source: Roberts, "Stock Market Patterns," pp. 5-6.

DIAGRAM 10-2 Harry C. Roberts's Graph of Actual and Simulated Stock Prices (12/30/1955-12/28/1956) with Dorsey's hand drawn comments

## Reading the Tree Leaves

What if, instead of peering into the abyss of the teacup at the wrinkled remains of disintegrating tea leaves, there were miniature tree leaves? To bring the metaphor back to the market, what if instead of looking at innumerable stock charts, relative strength indicators, government data releases, corporate press conferences, and media commentary, there were a number of well-defined market probabilities that could, with some time and practice, be identified? Our computer screens and TVs can be construed as nothing other than a virtual bottom of the teacup, which is littered with flotsam and jetsam of data. You, your broker, and your media maven can see whatever they want to see in this cathode ray cauldron of possible futures. As schoolchildren, we collected the leaves of trees, glued them on a board, and wrote the name of the tree next to the leaf. We learned to identify them by their form or “gestalt.” It was easy to distinguish a beech leaf from an oak leaf. It may have been slightly more difficult to distinguish an oak leaf from a maple leaf. In the same way, there may be relatively distinct patterns that are exhibited by markets. We know that our habitual perceptual bias will deny any patterns until we “see” them. Most market people never really look for patterns because they are trained to focus only on fundamental stories.

## Do You See What You See?

Taking the tree metaphor a step further, there are also market people who are really into trees. I mean they are obsessed with technical patterns. Like environmentally obsessed “tree huggers,” these inveterate “pattern proselytizers” almost have a fetish for finding arcane price symbols in any chart. These types are the ones who are easily picked on by the market majority and snottily deemed “Chartists.” There is bigotry here, no doubt. Yet, I would happily label the fundamentals-obsessed investor as equally narrow-minded or completely “brain-bred.” What we think about price charts is generally what we have been told to think. The tokenized technical “take” is that there may be a “head and shoulders” pattern. We believe the descriptions of others. Why not call it a torso pattern or even a brassiere. We may invent many names and labels, which provide only a wardrobe of technical market behavior. What is really required is an open mind that could interpret price history experientially. Even if we

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memorized all the technical names from “head and shoulders” to “scallop” patterns, we still wouldn’t understand them. One has to experience the behavior that lies behind these patterns. We don’t need secondhand descriptions. Negligees are nice but wives are spicier.

### Getting Graphical

A price chart of the market is an actual historical document, yet it is also an abstraction. It is not a video of all the behavior on the floor of the exchange, nor is it a recording of all the news and commentary of the day. In some ways, a chart as an abstraction may have some advantages. It is like an X-ray, which shows us the bones beneath the flesh. We all think that we can see an X-ray, but only radiologists are specially trained to read them. Mark Douglas, author of *Trading in the Zone*, describes our chart experience:

Think back to the first time you ever looked at a price chart. What did you see? Exactly what did you perceive? With no previous exposure, I’m sure, like everyone else, you saw a bunch of lines that had no meaning. Now if you’re like most traders, when you look at a price chart you see characteristics, traits, and behavior patterns that represent the collective actions of all the traders who participated in those particular trades.<sup>73</sup>

Indeed, what he describes is exactly what price bars on a chart represent. But unless we have been trained to really look, we may not see the complete substance of the chart. I have had traditional institutional investors at the most senior levels tell me that they do not see a rally or whatever it is that I see coming in the charts. They are not specialists, though they think they are. Everyone thinks they can read charts because they seem so simple.

I have also had the experience many times of talking to traders about charts and market behavior who understand exactly what I’m talking about but have not developed a cohesive vocabulary for what they know. There is almost a class distinction between the conservative institutional types who prefer line charts because they seem more scientific to the bar graph bloke who believes in Technicals. The conservative class disdains the typical bar chart of the trader because they don’t want

to be tainted by Chartism. Technique is not knowledge. We watch Tiger Woods on TV and tell ourselves we knew that the putt, which he missed, would break more to the left. Price histories, as expressed in charts, seem simple. They are just like golf in that respect, simple but not easy. Visually getting the graphical reality of the market may seem simple but it is not easy.

### The Magna Chartists

The real story on charts, technical patterns, and the like is who uses them. What the Wall Street party line presumes and would like to have you believe is that a handful of nerdy cranks do technical analysis. Wall Streeters, along with the media, believe it is amusing and interesting to see what these off-the-wall types are saying and thinking. Then the media will go back to real research by profiling a typical brokerage analyst who tells a palatable story. The truth is that an enormous amount of money is run based on technical studies of different kinds. I can assure you that some of the top investors in the world are familiar with, well versed in, and use charts. That does not mean that all great investors do or that those who do are slaves to head-and-shoulders patterns. However, few people really recognize the extent to which the perceived technical taboo suffuses financial culture. I know an investor who, over a ten-year period, had the best-audited investment performance based on returns and drawdowns. This man is a consummate trader and student of the market, though relatively anonymous. I have visited him in his remote location and watched him at work. He is in many ways the ideal investor because of steady returns and rigorous risk management. His entire philosophy and practice is based solely on old-fashioned technical techniques that were published fifty years ago. That is all he uses. He knows how to use them. He is only one of many great or magna chartists out there.

### Oh Say Can You See the Synaesthesia?

Synaesthesia, or the joining of sensations, has been described as both an affliction and a gift. It is sometimes described as the cross wiring of the brain. This joining or harmony between our brains adds an extra dimension to our ordinary experience. The typical synaesthetic

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occurrence is when someone sees numbers or words as being specific colors, or when someone hears music as having color.

Diagram 10-3 comes from an experiment conducted by Edward Hubbard, a psychology graduate student at the University of San Diego. It illustrates the acuity that synaesthesia can bring to visual experience.<sup>74</sup> The chart on the left seems like a jumble of “fives” to most of us. We don’t perceive a pattern. Yet, if someone told us there absolutely was a pattern, we would find it eventually. But the synaesthete would see the pattern immediately. They would see this jumble of numbers as revealed on the right-hand chart below where the pattern of twos stands out in bold. In reality, for someone with synaesthesia, it would be even more dramatic because the twos would actually be a different color than the fives. This is what market people call pattern recognition. While synaesthesia is relatively rare, it may point to a potentiality of cognition that anyone may touch on.

### The “Hoarse” Whisperer

What if the market is always whispering secrets? If these are “open secrets,” the apocryphal Mr. Market may actually become hoarse from

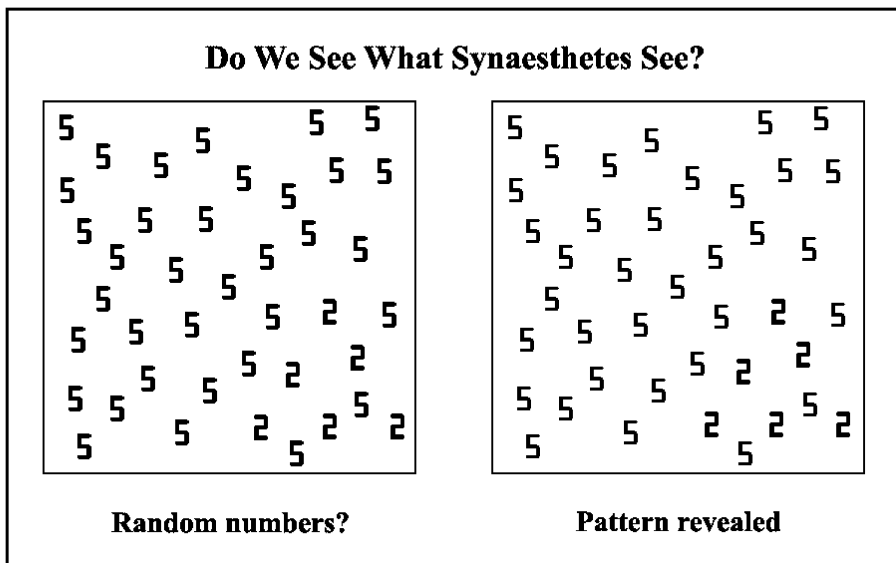


DIAGRAM 10-3 How Synaesthetes Easily See the Twos, Do You?

constantly whispering obvious behavioral clues. But no matter how plain something is or how much it repeats itself, it remains hidden until we see it. We generally only look at the surface of things. It is as if we see the surface color of objects but don't grasp their substance. You may have heard of the novel *The Horse Whisperer*. If you didn't read it, you may have seen the movie starring Robert Redford. If so, you know all about it. A guy gets to really know horses so well that he can tame them just by "sweet talking" to them. End of the story? Not quite. As usual, the perpetual propaganda process has been at work in the media. The real story is about a man named Monty Roberts who discovered or perhaps rediscovered how horses really relate to each other. From these simple observations, he learned how to read their language. Fact is, he simply saw what was there to see. He saw through the cultural bias that everyone else was blinded by. Interestingly, Monty has an unusual kind of color blindness. His achromatopic condition, as it is called, doesn't allow him to see in color but only in rich gradations of black, white, and gray. This, what some would call optical "defect," actually enhances certain qualities of visual acuity. It is reported that some achromatopic people can read a license plate, at night, 200-300 yards away!

The following is noted in the original biography *The Man Who Listens to Horses*:

Monty was once provided with contact lenses that allowed him to see the world in what we call living color. He, too, was appalled. The colors screamed at him, distracted and disoriented him. He parked the lenses in a drawer at home. "Military camouflage," he told me, "is a confusion of color. It stirs the eye up so you don't see the shape. The color blind just see the shape, but it also means we see so much more than the normally sighted."<sup>75</sup>

With this unique visual acuity Roberts set out alone as a teenager for weeks at a time to find and observe wild horses. He would just watch them. "I am reminded of how I felt when I looked thorough binoculars at that herd of wild horses. They seemed close enough to touch. I could see subtle shifts of the eyes, ears, tongue. These were pure movements, untainted by human intervention. That day I would watch for eight continuous hours."<sup>76</sup> This is seeing. Can we clear our mind of the financial bias about how markets are supposed to work? What if we were as ignorant about markets as most people were about

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horses? Can we simply observe the market in isolation and in duration? That is, being completely alone and just looking at the market for six to eight hours at a time. If we replicated these conditions, could we see something new about the markets? This is exactly the process that I have undergone in order to develop an understanding of the markets.

### Searching for Mr. Greenspan

We usually just glance at everything. A quick look is generally enough. But if we look at something more intentionally and with an open mind, we may be able to see more. Curiously, when we see things more wholly, it is easier to diagnose or differentiate the parts from the whole. This deconstruction may reveal patterns or patterns within patterns. The parsing of price history into smaller fragments is akin to the idea of the fractals in chaos theory. I think of it as market cubism, the art movement of the 1920s which attempted to break an image down into geometric components. I look at a history of market prices and then parse it down into various harmonic components.

Diagram 10-4 is a chart of the S&P 500 from August 24, 2000 to July 31, 2001. What are we to make of this history? Could something similar have been generated through random numbers? Probably. Is it some sort of optical illusion? Are there cognitive errors to be discovered? Could it contain what Mr. Greenspan referred to as “market price

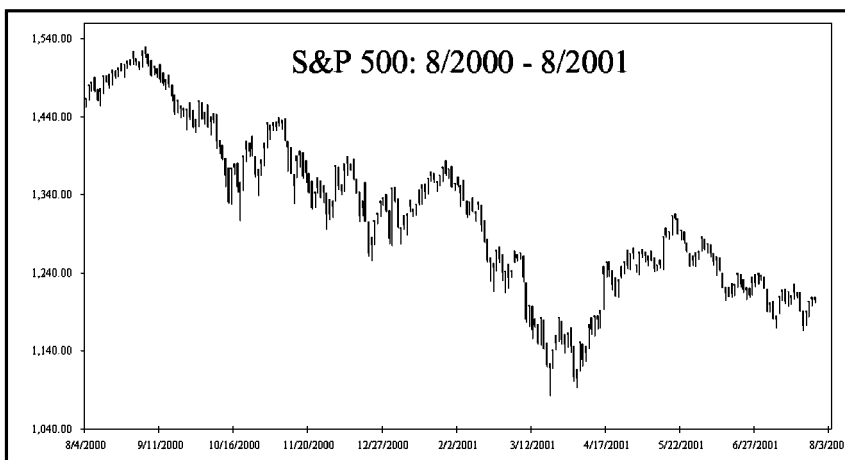


DIAGRAM 10-4 S&P 500 from 8/24/2000–7/31/2001

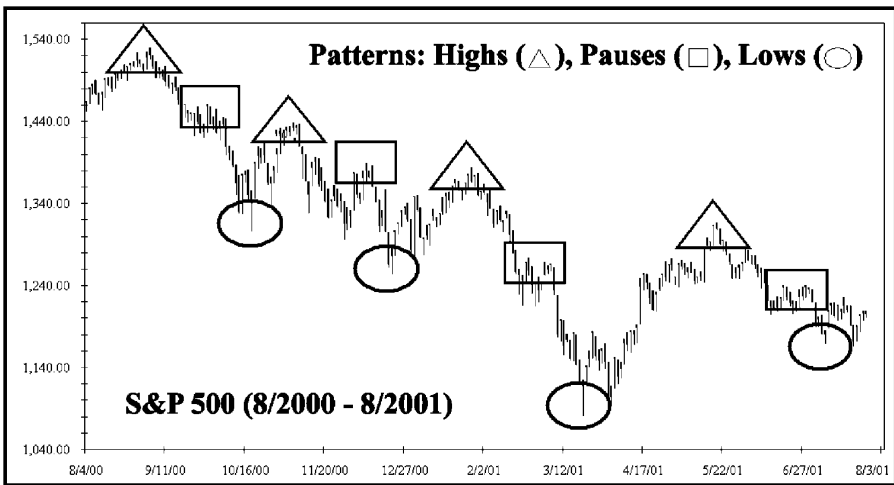
patterns?” For most market observers, it is probably best described as a choppy downtrend punctuated with one quite sharp decline into late March 2001, followed by a sharp rally into May. Or is it just another year of a difficult downwardly trending market? We have seen the Muller-Lyer illusion, Robert’s random stock graph, and the patterns that synaesthetes see. Is there a cognitive error in the real price history shown below? Will a transparency be revealed?

**Price Patterns Ho!**

Upon further inspection of the chart, there seems to be a recurrent pattern of sorts. Diagram 10-5 illustrates this recurrence of price highs, price pauses, and price lows. This is how the market is actually behaving during this period. You did not see this before. Now that you do, you may think that they are interesting but not so cogent. But have we finished looking?

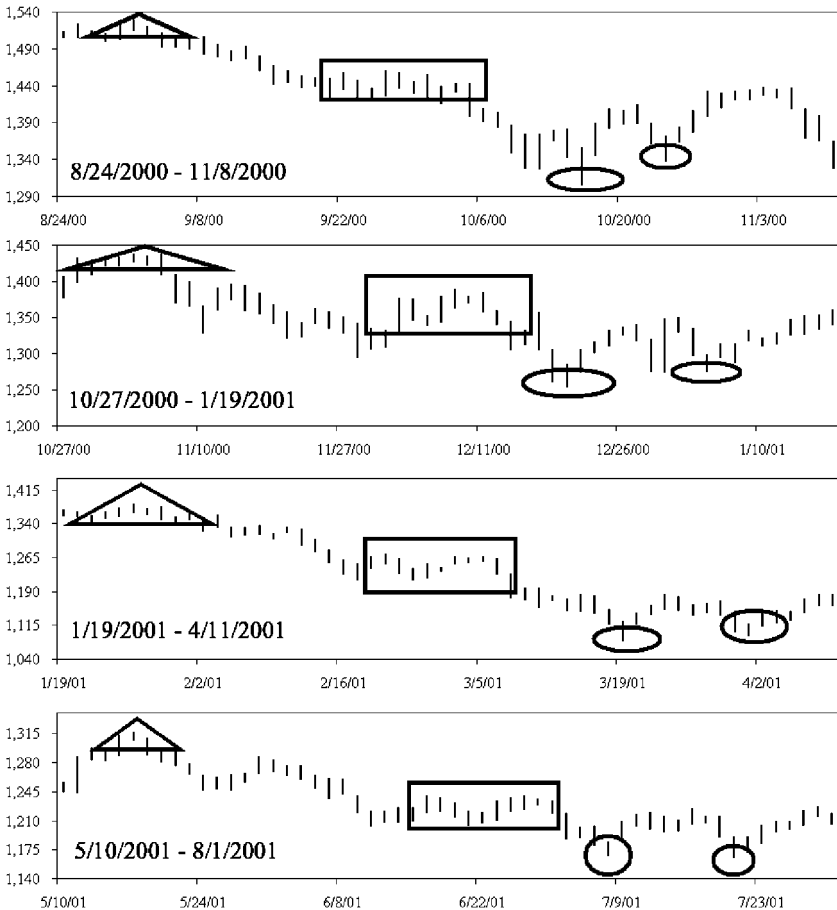
**Stacked Fractals**

If we take each of these sections, or fractals of the market, and compare them more closely, the pattern reveals itself more cohesively. In Diagram 10-6 we have stacked each of these fractals on top of each other.



**DIAGRAM 10-5 S&P 500 8/2000-8/2001 and Patterns of Highs, Pauses and Lows**

**Stacked Fractals S&P 500 (8/24/00 - 7/23/01)**



**DIAGRAM 10-6 S&P 500 (8/24/00-7/23/01) Deconstructed into Four Smaller time Periods or Fractals**

Each segment or “market time” of the pattern is cut and pasted vertically. This demonstrates how closely and cohesively “in time” the individual patterns recur. It is not just that they replicate as similar scenarios, they are nearly identical in their behavioral routine. Routine is an aspect of the primal brain that induces us to repeat the same behaviors at the same times. The highs, pauses, lows, and secondary lows are trading routines. We don’t need a fundamental reason, a mathematical expression, or a grand theory to see why the market acted this way.

This is simply a direct perception of the behavioral patterns of the market. Market Semiotics has used this micro fractal analysis for many years to isolate market probabilities.

### Drilling Down

There always seems to be more than meets the eye. In Diagram 10-7, we notice that after each price low there is a secondary low. It is as if the first small rally from the low is met with selling as participants view it as only another short-covering bounce. The market sells off again in a “scary” manner but does not make a new low. This is how the market behaves. The details of the recurrent fractal pattern of each section are detailed in Table 10-1. Notice the extraordinary similarity in the patterns: Each decline is between 32 and 36 daily bars, or trading days, long. The secondary lows are equally symmetrical. The upwardly sloping dotted lines in Diagram 10-7 refer to the length of the rally after each fractal decline. Each recovery rally in this fractal series has a different time ratio to the preceding price decline. The first rally is 50 percent of the decline, the next one is 75 percent, and the last one is 100 percent of the decline in terms of time. The duration of these reactions is quite interesting. It makes sense that the longest rally in time would come after the worst decline, which of course created the best low.

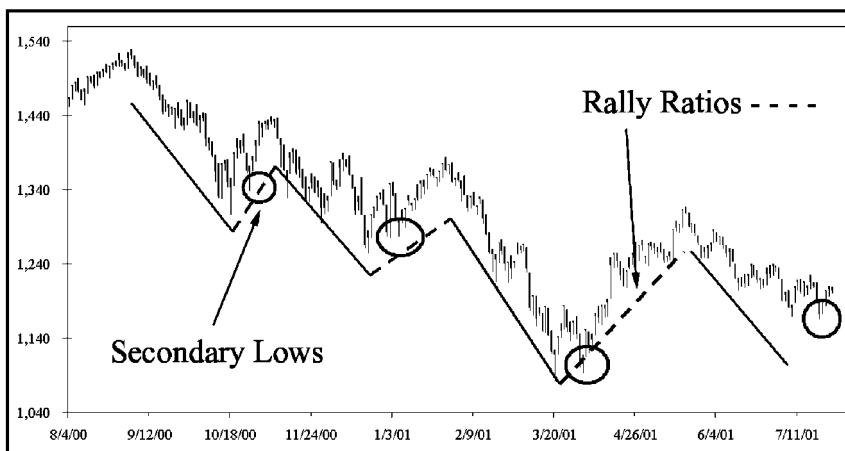


DIAGRAM 10-7 S&P 500 (8/24/00-7/23/01), Circles on Secondary Lows and Dotted Lines show Rally Retracement Ratios

TABLE 10-1 Fractal Sections of S&P 500 (8/24/00-7/23/01)

<i>Fractal Sections</i>	<i>Decline Patterns</i>	<i>Secondary Lows</i>
Fractal 1	33 Bars (15,7,11)	39 <sup>th</sup> Bar
Fractal 2	32 Bars (17,7,8)	42 <sup>nd</sup> Bar
Fractal 3	36 Bars (17,9,10)	45 <sup>th</sup> Bar
Fractal 4	35 Bars (17,11,7)	44 <sup>th</sup> Bar
Average Fractal Modes	34 Bars (17,8,10)	42.5 <sup>th</sup> Bar

**Psychological Stages and Sentiment Studies Explain the Fractals**

The table of stacked fractals shown in Table 10-1 is impressive, but it isn't just a singularly pretty piece of market history. The pattern is based on behavioral principles. In Diagram 10-8 we are looking at exactly the same price history. Here the tactical sentiment is the line graph overlaid on the daily price bars. The peaks in optimism and nadirs in pessimism generally coincide with the price patterns of each fractal. Furthermore, the "Semiotics Stages of the Bear Market," which

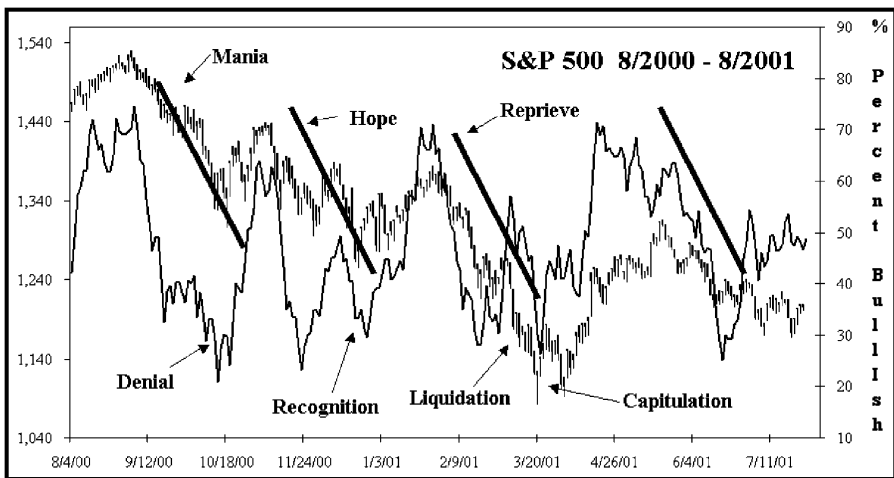


DIAGRAM 10-8 S&P 500(8/24/00-7/23/01), The Semiotics Stages of the Bear Market, and 5-day Sentiment

is also overlaid on the price series, shows the specific quality of each emotional market phase. These same semiotics stages were shown in the Introduction in Diagram I.1. In that instance, the entire bearish process unfolded over a two-year timeframe.

The same type of bearish process in Diagram 10-8 unfolded over an eight-month timeframe. There is no qualitative difference: one is just a fractal of the other. Again, a fractal is just a smaller, self-similar, recurring pattern. The Semiotics Stages of the market are an additional behavioral tool which can qualify each of the sentiment extremes. When we combine this psychological understanding of the market with the stacked fractal study of prices or the Body of the market, a rather complex but probabilistic behavioral profile emerges. One can have a pretty good idea what the market may do. I used this “market price pattern,” as Alan Greenspan would term it, to predict the decline into late March and the rally into May 2002. My clients made money. This is behavioral finance made precisely practical.

### The Final Deduction about Human Perception

Unless we “think” we know about something, it makes no sense to us. Therefore, if we are ignorant of something, we don’t “see” it, it doesn’t exist for us, or may be deemed “random.” This is our old Cartesian prison. It would seem to be more intelligent to assume that pattern and meaning may exist in everything. Nothing is random. There is no noise. There is only music and meaning in markets, of which we are not fully aware. Whether we are colorblind or color-gifted does not matter. Perception is about the courage to explore realities that are contrary to the complacent concepts of the consensus.

### Behavioral Bullets

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- We generally only see what we have been taught to see.
- Question what you think you see.
- Patterns in the market do exist despite what the rational school says.
- The behavioral trader needs to learn to see patterns and trade on them.

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- Emotional patterns repeat, Investment Themes repeat, and price patterns repeat. The behavioral trader determines when and how they repeat to create a profitable trading strategy.
- Investors are hardwired to make the same mistakes over and over again, and the behavioral trader profits by identifying these patterns of investor error.
- Never stop looking at how markets behave.