Table # 2 – RSI Look-back 3 periods versus 14 periods.

	Close	RSI N = 3	RSI N = 14
	1161.32		
1	1161.28		
2	1161.39		
3	1160.75	15.49	
4	1160.71	14.29	
5	1160.79	30.53	
6	1160.16	9.43	
7	1159.67	5.22	
8	1159.74	13.49	
9	1159.18	6.59	
10	1158.99	5.23	
11	1159.24	32.68	
12	1158.93	21.24	
13	1158.94	22.55	
14	1158.77	15.83	14.815
15	1158.78	17.98	15.075
16	1157.70	3.49	11.120
17	1157.09	2.07	9.589
18	1156.88	1.71	9.123
19	1156.56	1.23	8.450
20	1156.57	2.52	8.677
21	1156.61	9.64	9.641
22	1156.75	34.67	13.100
23	1156.71	30.99	12.947
24	1157.06	71.16	21.552

So, what can we tell about the RSI at this point?

1. The RSI value oscillates in a range between 0 and 100.
2. Small changes in price will cause larger changes in the RSI value.
3. Changing the look back 'N' time interval will cause the following:
    a. The RSI amplitude swings decreases, when 'N' is increased.
    b. The RSI amplitude swings increases, when 'N' is decreased.
4. The RSI includes prior price action within its value. This requires a large number of prior time intervals for the oscillator to stabilize.

Let's explore some of the internal characteristics of the Relative Strength Index. For this demonstration, we will use the first formula of the calculation also known as the 'Morris modified RSI,' which demonstrates certain internal characteristics of the indicator. Table #3 is a spreadsheet that shows the relationships between the Gain average and the Loss average as a ratio. The most important ratios in the table are in bold print for emphasis.

Table # 3 - Ratio Table

Up Avg	Dn Avg	RSI	Up Avg	Dn Avg	RSI
1	**1**	**50.00**	**1**	**1**	**50.00**
2	**1**	**66.67**	**1**	**2**	**33.33**
3	**1**	**75.00**	**1**	**3**	**25.00**
4	**1**	**80.00**	**1**	**4**	**20.00**
5	1	83.33	1	5	16.67
6	1	85.71	1	6	14.29
7	1	87.50	1	7	12.50
8	1	88.89	1	8	11.11
9	1	90.00	1	9	10.00
10	1	90.91	1	10	9.09
11	1	91.67	1	11	8.33
12	1	92.31	1	12	7.69
13	1	92.86	1	13	7.14
14	1	93.33	1	14	6.67
15	1	93.75	1	15	6.25
16	1	94.12	1	16	5.88
17	1	94.44	1	17	5.56
18	1	94.74	1	18	5.26
19	1	95.00	1	19	5.00
20	1	95.24	1	20	4.76

The RSI value calculates to 50 if the value for the Up Average is equal to the value for the Down Average (1:1 ratio). As the Up Average increases when compared to the Down Average, the RSI value steadily increases from 50 to 100. Careful examination of Table #3 reveals that the RSI value behaves logarithmically!

As the Up Average increases to infinity and the Down Average remains steady or decreases to a level that approaches zero, the rate of increase shown by the RSI slows to a crawl. Let's take a closer look at these ratios. When the ratio is 2:1, the up average is twice as much as the down average. In this case, the Relative Strength Index value is 66.67.

It is interesting to note that when the Gain versus Loss ratio changes from 1:1 to 2:1, the change in the RSI value is 16.67 points. When the ratio moves from 2:1 to 3:1, the RSI value only increases another 8.33 points. For the Relative Strength Index to hit the '80' level, a ratio of 4:1 is needed. This is an Up Average that is four times larger than the Down Average and is a condition that does not occur very often.

Looking back at Table #3 where the ratios are reversed, when the Down Average moves from 1:1 to twice the Up Average (1:2), the RSI value decreases to the same degree as a 2:1 increase. This pattern continues throughout Table 3 as the ratio decreases.

When the ratio is 20:1 and the Up Average is 20 times the Down Average, the Relative Strength Index value at this time is only 95.24. This is a market condition that almost never occurs when the look back period is 14 bars!

By carefully studying the ratio relationships in Table # 3, we can glean the following information about the Relative Strength Index:

1. When the RSI is above 50, the indicator is telling us that the average gain exceeds the average loss.
2. When the RSI is below 50, the indicator is telling us that the average loss exceeds the average gain.
3. The RSI behaves like a logarithmic curve.
4. Anytime the ratio exceeds 10:1, the market has been experiencing a very strong move up.
5. Anytime the ratio exceeds 1:10, the market has been experiencing a very strong down move.
6. The largest increase or decrease in the RSI value occurs when the ratio changes from 1:1 to the next whole number (2:1 or 1:2).
7. The RSI value experiences its largest changes in value as it oscillates between the index values of 40 and 60. In other words the RSI is most sensitive to price change when the RSI is oscillating between 40 and 60.

As we shall see later, these observations are crucial to fully understanding the interplay between price activity and the RSI. It is not enough to understand that you should take a certain action whenever the RSI does this and/or that. It is important that you also understand the "why!"

CHAPTER 3

PRICE BEHAVIOR

A thorough discussion of price behavior deserves its own book. However, in our effort to understand the Relative Strength Index, we will limit our discussion to the price behavior characteristics that relate to how the RSI behaves.

In this section, we will discuss price behavior. Unfortunately, when the majority of traders consider price behavior, they immediately think of price patterns. Price behavior causes the creation of certain bar (price) patterns that are visible on a price chart. Just as the moon creates tidal forces that create high and low tides, price behavior creates price patterns. We could plot the levels of high and/or low tide on a chart and use the information contained in the chart to surf or launch a boat. However, simply seeing the frequency of high and low tide levels will not explain what has caused the different tide levels that are shown on our chart. Similarly, a price chart displays various patterns that could be used to generate profits. But without understanding the why of how these patterns were created, we will not be able to trade as profitably as we possibly could. This chapter focuses on the 'why.' What are the forces that cause bull and bear markets? To profitably use the Relative Strength Index, we must understand certain minimum concepts regarding price behavior.

The price for any commodity futures contract or security is based upon the beliefs of the strongest group in the trading arena. Many people think that they understand price action – most do not. If the majority of traders really understood price action, the constant up and down volatility that we see in the market place would largely disappear. In its place, we would see relatively steady prices with sudden huge uni-directional price movements with no contra-trend or retracement moves.

CORN TRADERS

The best way to explain price behavior is using an example with three hypothetical corn traders (Adam, Bob and Charlie) plus all of the on and off-floor traders. The price for a bushel of corn or any other commodity or security is the price that two traders agree to at an instant in time – free of duress. After all, if one trader is holding a gun to the other trader's head, forcing him to sell the bushel of corn cheaply, it isn't a valid trade and does not represent a valid price. If the trade was "forced", the price of that "trade" is not a valid representation of what a bushel of corn is worth in the real world and is worthless information to other traders.

Traders who agree to a mutually established price provide other traders with a certain amount of information. This information may or may not be valuable to some or all of the other traders. If there is only one trade, the only thing the other traders can determine is that the price these two traders think is fair is "x". Should the two traders agree a few minutes later to make another trade, then this new information will tell all of the other traders that the price has changed up, down, or has remained the same. From the trades, the other corn traders cannot tell anything more than that the price of corn has changed. It is also not possible for them to know if the trade price was made free of force. If the trade price is made under coercion/force/threat, then that trade price is invalid. *For example, if we assume that both corn traders are well informed traders and neither one is under any pressure to buy or sell corn other than a desire to profit, then the price the corn is traded at represents a valid price. Should the trade be made because of force or coercion, the price of the trade is invalid.*

Why is this price information important? Because at its most simple level, all that is needed to make a market place are two traders who agree upon a price of exchange. Many people think that the market is constantly determining the "best" or most "accurate" price for a particular commodity or security. This typical view is that price is an accurate representation of all known information at the instant in time that a trade was made. The point that I am trying to illustrate is that price is often nothing more than a number that two traders agree to and nothing more. I realize that this is opposite of what many "experts" say.

There are many types of traders. In this example, we are using corn but in reality, these types of traders exist in all markets. Listed below are just some possible classifications:

1. Small Corn Producer – knowledgeable only about his local market place and his farm.
2. Large Corn Producer – knowledgeable about his national market place and the farming conditions in the nation.

3. Large International Diversified Corn Producer – knowledgeable about the international market place and the growing conditions internationally.
4. Small Corn Reseller – intimate knowledge about local market
5. Medium Corn Reseller – knowledgeable about national market place.
6. Large International Reseller – knowledgeable about international market place.
7. Small Speculator – limited capitalization, limited ability to withstand losing positions.
8. Medium Speculator – better capitalization with the ability to withstand losing positions while waiting for market reversals.
9. Large Institutional – Significant capitalization, lots of "brain power" with the ability to hold large positions for long periods of time regardless of price movement.
10. Large Speculator – Immense capitalization, lots of "brain power" with the ability to hold large positions for long periods of time regardless of price movement.

There are many more "types" of traders. Conventional wisdom tells us that price is an accurate representation of the corn market. So, if our two corn traders are small corn producers and they agree to a price on a small amount of produce – does their price reflect the "fair" price for corn? Do you think that a large international agricultural business concern like Archer-Daniels-Midland believes this is a "fair" price for corn?

I am not saying that the price agreement made by 2 small corn producers is not important because it is. I am saying that it is important to realize that without any knowledge of who made a trade or whether a trade was made free of force or threat, the price of a trade is nothing more than a number. This is also the number that everyone feeds into their computers for the software to crunch the numbers and display an indicator line on a computer screen.

For those of you that believe that ADM or other large international concerns do not care a hoot about these two traders, I can tell you about other traders who believe that the two local corn farmers have a more intimate knowledge of the growing conditions of corn, and consequently their "price" is more valid.

Our two corn traders could be anyone. Let's assume that the market has just opened and we have Adam offering to buy (bidding) corn at 219.00 and Bob who is offering (asking) 220.50 for his corn! They agree on 220.00, generating the first trade of the day. A minute elapses and Charlie decides to accept Bob's asking price of 220.50. Bob and Charlie, after conducting their business, are no longer interested in any more trades. The increase in price causes a few other traders in the pit to see that the price

is going up so they consequently jump into the action, bidding for some corn, pushing prices to 225.00.

Adam, seeing a chance to make some easy money, decides to sell the corn contract he purchased at 220.00 and a second contract making him short the market. This trade takes place at 225.25. Upon seeing a trade at 225.25, Charlie reconsiders his position and decides that now would be a good time to add to his long position by buying 100 contracts. In his buying frenzy, he continually accepts the asking (or offering) price. Consequently, traders who desired to sell their corn contracts see an active buyer steadily raising the offering price to 230.00.

Adam realizes that he is unable to hold his short position at 225.25 because he doesn't have the capital to meet the margin requirements, decides to buy a contract to exit his short position. However, because of Charlie's rush to buy his large position, the sellers have raised their offer to 235.00 and will not accept anything lower! This forces Adam to hit the ask and take a 10-cent loss! At this time an off-floor trader decides that these prices are unreasonable and decides to sell one and two contracts at a time to establish a short position just as Adam had attempted earlier. However, he has the capitalization to hold his position until prices drop and he lowers his asking price to less than 235.00, which was the asking price of all of the other corn sellers.

This off-floor trader lowers his asking price to 234.50. At this price, his offer is the best price available to the buyers in the pit. They hit his asking price and their orders are filled immediately. As our off-floor trader wants to establish a large short position, he lowers his offer below the other competing sellers again and his asking price is hit again. Our off-floor trader continues to lower his offer until he has no more desire to sell, which causes the competing sellers to lower their offers.

Every novice trader understands this simple example of price generation. What many traders do not realize is that the price activity was conveying no more important information about how healthy the current corn crop was going to be in the fall than it was forecasting the price of apples next spring. The price information was conveying the perception of corn traders that corn would be more expensive in the future. The "why" it would be more expensive was totally unimportant.

Adam, with the first short position, and our off-floor trader both perceived that prices were too high and should reverse and move lower. Unfortunately, Adam entered his short position too early and was forced to exit his trade with a loss. The pricing decision where Adam exited his losing trade was not made free of duress. Adam had to exit this trade because he was unable to meet the anticipated margin call to maintain his position. Since this trade was made under duress, was the price high of 235.00 repre-

sentative of the market internals? Did it represent the real value of corn? No, it represented the value corn sellers perceived in the instant of time they were focused upon. Whenever sellers agree that the price will continue higher and refuse to lower their offering or asking prices, you are seeing a market that has become hysterical. Just because corn traded at 235.00 while Charlie was acquiring his position was irrelevant.

CHAPTER 4

THE REAL NATURE OF THE MARKET PLACE

What is the real nature of the market place? The market place simply consists of traders that are focused on a unit of time with every expectation that the market price action will move in their favor within their established unit of time. Traders have varying levels of capitalization, experience and risk tolerance. Since traders have different levels of capitalization, they also have different time horizons or time "envelopes" that they choose to focus on. When the market behaves in a certain fashion within this "unit of time," the trader who is focusing on this "unit of time" will undertake a certain action or actions.

The reason that prices move is because of how traders perceive the reality of the market place in a certain unit of time as dictated by their capitalization, experience, and risk tolerance." In every sense of the word, market action is a fight between traders focused on what the price will be doing in 5 minutes versus those who only care about where the market will be in 5 days, 5 weeks or 5 months. To complicate matters a little more, some of these combatants are using their rent money while others have more capitalization than the Gross National Product of many of the world's countries!

Generally, the larger the capitalization of the trader, the longer he or she is willing to wait for prices to move in their direction. As the capitalization level increases, the ability to withstand unfavorable price action increases as well. Very well capitalized traders are also unable to establish large positions at one time without moving the market price against their position. This is why they must buy on weakness and sell on strength. These well-capitalized traders generally "fade" the trend of the traders who are focused on shorter time units than they are focused on.

So, what am I saying here? The price you are seeing on your computer screen is nothing more than a number. It could be the result of two "billion dollar hedge funds" agreeing to trade 10,000 contracts at a price, or it could be two producers plowing on the 'back 40 acres' agreeing to trade a one lot at a price. You don't know. ***The price is where traders of different timeframe perspectives and capitalization levels come together in an instant of time agreeing on a certain price. In order to understand where prices are going, it is important to understand which "time perspective" is the stronger force, and then go with that force.***

"The FORCE is more your friend than the trend."

Making an attempt to determine where prices are going by using only a daily chart or a 5 minute chart (or whatever timeframe you like or want to trade in) is much like standing in the trading pit trying to determine which floor traders are filling orders for the traders with better knowledge and/or capitalization. In many ways, using only one bar chart plotted in one unit of time is a losing proposition. To become a great trader, you must develop the ability to look at price charts in different time units such as monthly, weekly, daily, 60-minute, 30-minute and 5-minute bars. You need to have the ability to recognize which timeframe (or level of capitalization) is creating the price action. There are times when floor traders (as shown on a 50 second bar chart) are creating all of the volatility in the market. There are other times that it will be the 60-minute traders who are dominating the action. While at other times, it will be the weekly traders who are the dominant force in the market.

The Relative Strength Index will help identify which timeframe is in charge because it instantly conveys vast amounts of market information which is mostly ignored by other traders. I am not saying that price is not important at any one moment or that one category of trader is more informed than another group of traders. Price is extremely important and even large hedge funds can go 'belly up.' What I am trying to emphasize is that the two opposing parties of a trade are often focused on different timeframes and have totally different capitalization levels.

Conventional trading wisdom says that if Adam buys corn at 220.00 from Bob and prices decline to 219.00, Adam is upset because he is losing money. Adam might not care that the price has declined to 219.00 or 209.00 because he is focused on a much longer timeframe! Should this be the case, both traders still believe that they got a fair price and both traders are happy with their market positions.

CHAPTER 5

PRICE BEHAVIOR & THE RSI

What price behavior goes with or compliments the Relative Strength Index behavior? As we shall see, there are certain RSI behavioral characteristics that indicate certain things such as market reversals, trends, weakening of trend. In many cases, there are certain price behaviors that coincide with this RSI behavior.

When we choose a certain unit of time to create a chart, we have decided to focus our attention on those traders that also think that this timeframe is important. For example, if we are looking at a 5-minute chart, we will be focusing on other traders who also think a 5-minute chart is (or might be) important. The term "timeframe" merely refers to the time interval used in creating the bars on the chart. A trader with a 5-minute timeframe is looking at a chart where the time interval of each bar is 5 minutes. Likewise, a trader with a 30-minute timeframe constructs charts with bar intervals of 30 minutes.

Let's talk about how prices move from the perspective of traders observing the market from different timeframes. Generally, traders focus 90% of their energies on one timeframe. The other 10% of their energy is spent looking at the infinite variety of other timeframe choices that are available. A 5-minute trader might also look at a 30-minute chart, a tick chart, and a daily chart. A 60-minute trader might choose to observe a 10-minute chart and a 240-minute chart. It is important to consider that the combinations of time unit intervals are endless.

In the following example, we will use a 5, 15, 60 and 240-minute charts. Corn has been moving sideways between 210 and 230 for the last three days. Naturally, there are traders that sell corn every time the price approaches 230 and buy when it approaches 210. In our example, today the price goes to 230 and then continues higher to 230.50 making a new 3-day high. This new high is very clearly seen by 5-minute traders using a 5-minute chart.

As prices climb above 230 on a 5, 15, 60 and 240-minute chart, in the first 5 minutes of trading the current bar is going up. If we were looking at a Japanese Candlestick chart, the candles would be all white in all timeframes. After the first 5 minutes above 230, the price continues to climb to 232. On the 5-minute chart, there are 2 bars going up. On the 15, 60, and 240-minute charts, we still have only one bar moving higher. If the price over the next 3 hours rallies to 240, we will see 36 bars on the 5-minute chart reflecting this climb higher. We will see 12 bars on the 15-minute chart, 3 bars on the 60-minute chart, and only the current bar in the 240-minute chart.

Seldom will you see all of the bars in all of the charts moving in the same direction. Usually, you will see a rally followed by a retracement followed by a new rally to new highs. Because of the different time perspectives of different traders, the different charts show the struggle between the Bears and Bulls who are focused on their own timeframes.

When the price originally moved above 230, it might have caught the attention of everyone in all timeframes or only the attention of the short-term 5-minute traders. Typically, the longer timeframe traders don't care too much if the price moves above a previous high on a shorter timeframe chart by one or two ticks. They want to see a larger breakout or see how prices behave after the breakout. In any case, as the price moved above 230, the short timeframe traders noticed the breakout and began to actively bid for corn with the more anxious ones hitting the asking/offer price. As more and more traders hit the offer and the number of buyers increased, the traded price of corn is also pushed higher.

This is a key point to understand – there is a limit to how long the short-term traders will perceive that the current price is "cheap." As soon as the 5-minute traders perceive that the last trade is no longer "cheap," the 5-minute traders will all stop actively bidding for corn. It is at this point that the buyers are no longer willing to buy at the offer/ask price. This reality causes one or more sellers to accept something lower than the offer and prices will begin to drop. The only thing that will save the 5-minute Bulls is if the traders in the next longer timeframe believe that prices could be ready to rally and begin to buy. For example, the 5-minute traders began to buy because prices had rallied to a point where they had "broken through resistance" and were moving higher. For the next longer timeframe traders to also think that prices are moving higher, the 5-minute traders must push prices high enough to convince them from their timeframe perspective.

If the Bulls in the next longer timeframe, for instance 15-minute traders, decide to buy because of a breakout, then the 5-minute Bulls are saved while the 5-minute Bears are losing money. These 5-minute Bears are now forced to cover their short

positions as prices continue to rally. This rippling process continues as long as the traders in each next longer timeframe perspective enter the market in the same direction.

A short-term rally will fizzle if the shorter-term traders push prices higher and the next longer timeframe traders decide that prices are "too high." These traders can begin to short or fade the rally or do nothing, waiting to buy the retracement. Because the longer timeframe traders are typically better capitalized and can trade more contracts, they have the ability to stop this upward price movement. If the longer timeframe traders begin to earnestly sell into the rally, they will hit the bid causing the offers to decline and immediately halt the increasing price of corn. This activity is best revealed in the primary as well as the shorter timeframe charts of the sellers.

Once these longer-term timeframe traders begin to short the rally, they have in effect drawn a line in the sand. They have told ALL of the shorter timeframe traders what price they believe is "too high." At this point, the battle of whose perception of the corn market is correct has commenced. Do the shorter-term traders have the correct perception that prices are ultimately going higher or do the longer timeframe traders have it right?

When the retracement of a rally is shallow, it indicates a stronger opinion of the shorter timeframe traders versus the opinion of the longer-term traders. Alternatively, if the longer timeframe traders agree with the shorter timeframe traders (that the market is ultimately heading higher), they stand aside rather than fading the previous rally knowing that the 5-minute Bulls will exhaust themselves and prices will retrace. This is when they look to enter the market. If the price of corn retraces less than 33% of the prior rally, then we could say that the 5-minute Bulls are stronger and/or the 15-minute traders agree with the shorter-term timeframe opinion. Should the Bears push the retracement to 50% or more, the 5-minute traders are probably being overpowered by a more powerful longer timeframe. Should the retracement be more than 66%, the traders in the shorter timeframe that caused the price movement would be in trouble.

In the next section, we cover Retracement in more depth. The point for now is that it is the shorter timeframe traders that created the initial rally and it is the longer timeframe traders that halt it, or fail to push prices higher. These short-term traders will only bid the price higher to a point. It is at this point that the professional short-term traders begin to take their profits. The only thing that can save the novice short-term traders is the traders in the next longer timeframe (15 minute in this example) deciding that prices have potential to move higher causing them to bid the price higher.

It is just as likely that prices will be pushed lower as the longer term traders decide that prices are too high and begin selling. After halting the rally by selling into its strength and forcing prices lower, the longer term traders may decide that prices are low enough to begin buying, eventually pushing prices to new highs. This is usually done after pushing prices below the previous lows and panicking the shorter-term traders allowing the longer-term traders to once again fade the shorter-term traders by buying into weakness. As these different timeframe traders struggle over whose perception is more correct, the retracements and rallies reveal themselves in the bar charts and more importantly in the RSI. The Relative Strength Index reveals when the next longer timeframe traders agree with the shorter timeframe traders and when they disagree.

If everyone agrees that prices are moving higher, market prices will move up strongly. On the days when there is the strongest agreement, there is a limit move! On these days, prices move in only one direction and pity the poor trader who happens to be opposite this move!

Because there are so many different markets and different timeframes in these markets, it becomes extremely difficult to describe a universal sequence of bars that will indicate when the shorter-term traders are tired. Each market and timeframe is different and has a different look. This is a subject that is very complex and is well beyond the goals of this book

As a trader, you are looking for a certain pattern, behavior of price, or indicator that re-occurs in what appears to be random fashion. When this pattern does occur, it signals a reversal in price. This pattern may not occur at every price reversal but it usually indicates a reversal with a high degree of probability. For example, when looking at a 5-minute chart of the cash S&P 500, a price pattern that occurs occasionally just before prices reverse lower is 2 bullish belt hold lines with the close being at the high appearing within a rally. A quick explanation of bullish belt hold lines is that it is a candlestick formation where the open is also the low and the close is at or very near the high.

The 2 bullish belt hold lines work whenever the 5-minute timeframe traders are dominant. When a longer timeframe enters the battle, this pattern fails. The longer timeframe could be 7, 10, 15, 18 minutes or whatever. This logic works today (2/2002), but probably will not work in the future because the market characteristics are constantly changing. As a result, the candlestick characteristic will need to be changed or the number of belt hold lines referenced in the past might need to be changed.

You are the one to best determine what price behavior will indicate to you when a particular timeframe is dominant. I realize that this task may appear daunting, but it is not as difficult as it initially appears. You want to discover a bar or candlestick relationship that occurs at market tops or bottoms. It is okay if this behavior doesn't work all of the time because the failure will indicate that a different timeframe has become the dominant player. How do you know when a particular timeframe is dominant in a market rally or decline? When the price advances or declines and the pattern looks like a staircase, it usually indicates one timeframe being dominant.

Build a chart using Japanese Candlesticks in whatever timeframe you prefer, print 30 pages of charts, identify the tops and bottoms, and begin looking for candlestick patterns. Look at the relationships of the shadows, opens, highs, lows, and closes. Keep in mind that you are looking for relationships that occur infrequently. When they do occur, they typically indicate a top or bottom. It is not important if they fail at times, you are using these patterns in conjunction with analyzing the RSI. The RSI is the primary vehicle that we are going to trade with. You will use these relationships as an aid to identify tops and bottoms.

CHAPTER 6

BASIC RETRACEMENT THEORY

In the previous chapter, we learned that the capitalization level of a trader largely determines the timeframe that they focus the greatest amount of energy upon. In our analysis, we want to know what timeframe is in control or has the momentum and align our trading with that timeframe. As traders, we want to trade with the group that most closely matches our own capitalization and time horizons. However, we must always trade in alignment with the strongest momentum. There are three ways to accomplish this: a thorough understanding of price movement, retracement levels, and the Relative Strength Index.

A common question concerning timeframe is, "What is considered a long or short timeframe?" This determination is subjective to each trader and is largely based upon his or her capitalization. The "timeframe" generally preferred is the average price range within a fixed interval of time translated into money falling within the risk tolerance of the trader. In other words, an undercapitalized trader that has difficulty meeting the margin requirement for the S&P E-Mini may be comfortable with a $200 loss, which corresponds to the average range of a 5-minute bar – but would be devastated with a $2,000 loss, which corresponds to the range of a two-hour or four-hour bar. As a result, an undercapitalized trader will focus most of his energy on trading a 5-minute chart. The better-capitalized trader will focus most of his energy on trading a longer timeframe such as the 2-hour bars.

From this point forward, I will use the S&P for the duration of the book. When day trading, there are three dominant timeframes that have a crucial influence: the big timeframe (daily chart), the intermediate timeframe (30-minute chart), and the short-term timeframe (5-minute chart). Generally, this is true for all markets. In the following examples, I will be using a 5-minute chart. Please note that the percentages apply in all markets and timeframes. When position trading, the three dominant timeframes are daily, weekly and monthly.

To fully explain the theory of retracement would require another book because it is a very involved subject. However, the following explanations of basic retracement concepts should suffice in understanding the RSI.

Before discussing retracement theory, we need to discuss a mathematician named Leonardo Fibonacci de Pisa, who lived in the year 1202 A.D. He decided to investigate how fast rabbits could breed under ideal hypothetical circumstances. He wanted to determine how many pairs of rabbits he would have if he placed one breeding pair of 2 week-old rabbits in a field. Female rabbits conceive at one month of age with a gestation period of one month. At the end of two months, the female can bear babies. For this problem, Fibonacci limited the number of hypothetical babies a female could bear at two (one female, one male). He further assumed that the rabbits would never die and every female would produce two rabbits every month from the second month forward for the next year.

At the end of Month # 1, the two rabbits mate and there is 1 pair of rabbits. At the end of Month # 2, there is the initial pair and a new pair of baby rabbits, giving 2 pairs of rabbits. At the end of Month # 3, the initial pair has another set of babies, giving 3 pairs of rabbits. At the end of Month # 4, another pair of baby rabbits is born to the initial pair and a pair of baby rabbits born to the first pair of babies born at the end of the second month giving us 5 pairs of rabbits. By continuing this exercise, you can see that the sequence is: 1, 1, 2, 3, 5, 8, 13, 21, 34, ... The formula is for the sequence is:

$$f(n)=f(n-1)+f(n-2), \text{ if } n>2.$$

This sequence of numbers (1, 1, 2, 3, 5, 8, 13, 21, 34, ..) is seen in nature when one examines the family tree of honeybees. The family tree of a male drone bee has the following: one parent (male drone bees result from the queen's unfertilized eggs), 2 grand parents, 3 great grand parents, 5 great-great-grand-parents, and 7 great-great-great-grand-parents. This cycle also occurs in other natural phenomenon.

We can see that the Fibonacci number sequence occurs in nature by counting the number of petals on a flower. Some flowers have a very precise number of petals, while others, if averaged, will have the following number of petals.
http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/shell.gif

Table # 4 – Fibonacci Numbers in Flowers

# Petals	Flower
3	Lily, Iris
5	Buttercup, Wild Rose, Larkspur, Columbine
8	Delphiniums
13	Ragwort, Cineraria
21	Aster, Chicory
34	Plantain, pyrethrum
55, 89	Michaelmas daisies

Table # 5 – The First 50 Fibonacci Numbers (numbers in BOLD are also prime numbers)

0	55	6,765	832,040
1	**89**	10,946	1,346,269
1	144	17,711	2,178,309
2	**233**	**28,657**	3,524,578
3	377	46,368	5,702,887
5	610	75,025	9,227,465
8	987	121,393	14,930,352
13	**1,597**	196,418	24,157,817
21	2,584	317,811	39,088,169
34	4,181	**514,229**	63,245,986

Does anyone remember where the Dow Jones Industrial Average encountered resistance in 1973 or 2000?

If we place the Fibonacci number sequence in a column and divide the first Fibonacci number by the next successive Fibonacci number, we obtain the series of numbers in Column A. If we divide each number by the one preceding it, we find the following series of numbers in Column B.

Table #6 – Fibonacci Ratio Products

Fibonacci #	A Row #N / Row N + 1	B Row #N / Row N - 1
1		
1	1.00000	1.00000
2	0.50000	2.00000
3	0.66667	1.50000
5	0.60000	1.66667
8	0.62500	1.60000
13	0.61538	1.62500
21	0.61905	1.61538
34	0.61765	1.61905
55	0.61818	1.61765
89	0.61798	1.61818
144	0.61806	1.61798
233	0.61803	1.61806
377	0.61804	1.61803
610	0.61803	1.61804

We can expand on the concept of dividing a Fibonacci number by a subsequent Fibonacci number and get the following table (where "N" is the Row #):

Table # 7 – Fibonacci subsequent ratios

Fibonacci #	N/N+1	N/N+2	N/N+3	N/N+4	N/N+5	N/N+6
1						
1	**1.0000**	0.5000	0.3333	0.2000	0.1250	0.0769
2	**0.5000**	**0.3333**	0.2000	0.1250	0.0769	0.0476
3	**0.6667**	0.4000	0.2500	0.1538	0.0952	0.0588
5	0.6000	0.3750	0.2308	0.1429	0.0882	0.0545
8	0.6250	0.3846	0.2381	0.1471	0.0909	0.0562
13	0.6154	0.3810	0.2353	0.1455	0.0899	0.0556
21	0.6190	0.3824	0.2364	0.1461	0.0903	0.0558
34	0.6176	0.3818	0.2360	0.1458	0.0901	0.0557
55	0.6182	0.3820	0.2361	0.1459	0.0902	0.0557
89	0.6180	0.3819	0.2361	0.1459	0.0902	0.0557
144	0.6181	0.3820	0.2361	0.1459	0.0902	0.0557
233	0.6180	0.3820	0.2361	0.1459	0.0902	0.0557
377	**0.6180**	**0.3820**	**0.2361**	**0.1459**	**0.0902**	**0.0557**

These ratios quickly approach equilibrium where the result barely changes. We can take these numbers and create a table of retracement levels that are based upon the Fibonacci number sequence. This is the Retracement Table.

Table # 8 – Fibonacci Retracements Table

0.0557
0.0902
0.1459
0.2361
0.3333
0.3820
0.5000
0.6180
0.6667
0.7630
0.8541
0.9098
0.9443

To summarize, the Fibonacci sequence of numbers were discovered more than 800 years ago. The relationships are based on naturally occurring phenomenon that appears in fixed sequence. The primary way traders use the series is not the number sequence itself, but the ratios that are created when the numbers are divided into a preceding Fibonacci number. The decimal products of these numbers are used in retracement theory. Using retracement theory, we can enter into a new position or add to an existing position. Once prices bounce, we can use the "bounced price" as a stop price.

Basic Retracement Theory

When looking at a price chart, it is readily apparent that prices fluctuate up and down. These fluctuations seem to occur at random. As you become more comfortable working with the concept that there are multiple timeframes being reflected in any chart, this apparent randomness becomes more understandable. However, it is important that you understand when price retraces its prior move and finds support or resistance at 14.6%, 23.7%, 38.2%, 50%, 61.8%, 76.3%, or 85.4%, the market is telling you that it has "discovered" a key number. This is a key number that you should remember when placing your trailing stop.

If the market is rallying, we can expect that at some point the Bulls will get tired and prices will retrace a part of their preceding rally. This retracement will be more than 5.5% and less than 38.2% of the move, if the trend is strongly up. If the trend is moderately strong, the retracement will be 38.2% to 50%. The retracement will be between 50.0% and 66.7% if the trend higher is in danger of failing. If the retracement falls between 66.7% and 85.4%, the trend has a high probability of failing.

For our purposes, there are three types of basic retracement — shallow, medium, and deep. Understanding basic retracement theory will help us to identify whether a trend is strong, moderate or weak by the percentage of its retracement. In addition to basic market retracement, there are complicated retracements that involve multiple timeframes consisting of longer or shorter time cycles. These complicated retracements will not be discussed in this book. Before using retracement theory, we must allow the price to move a certain amount of points and time. For example, if we are following a rally in the S&P and are looking at a 30-minute chart, then we want the rally to move more points and last longer than on a 5-minute chart before attempting to use retracement theory.

The question that arises most often is what amount of price movement is required before retracement theory can be used effectively? To some degree, the answer is subjective. Prices retrace lower after rallying because traders in the timeframe that started the rally are tired and have overextended themselves in the rush/push to higher prices. We want to determine what amount of price movement for each dominant timeframe (day, 30 min., 5 min.) would indicate that these respective timeframes are overextended. We are looking only at price movement in the amount of points – not price patterns. There are two ways to accomplish this objective.

First Method: Determine the average price movement for the average rally/decline in the timeframe that we are looking at. This is accomplished by examining at least the previous 100 or so rallies, and plunges in the timeframe to be studied. By observing the number of points before a retracement occurs on average, we can accurately judge when a move is probably over and ready to begin a retracement. For example, if we observe that for the previous 100 rallies prices in a 5-minute chart moved an average of 7 points – then we know that after market prices have moved 6 points, the professional 5-minute traders will usually be looking to take profits.

Second Method: Calculate the average price range for each bar in a longer time interval and use a percentage of that range to indicate what amount of price movement is needed before using retracement theory. The longer timeframe to use is one where "one time interval" in the longer timeframe consists of 13 shorter time intervals.

Imagine looking at a 30-minute chart of the cash S&P. We know that there are 390 minutes in the average trading day or 13 30-minute bars. In order to use retracement theory on a 30-minute chart, we need to know when the 30-minute traders are probably tired. We can examine many significant prior rallies on the 30-minute chart or we can take an average range of the high and low in the next significant longer timeframe multiplied by a factor of 13. In this case, it would be a daily timeframe as it takes 13 bars in the 30-minute chart to create 1 bar in the daily chart.

Using the 10-day average range of the S&P to indicate when the 30-minute traders are tired will tell us when we should begin to expect a market retracement. If we are using a 5-minute chart, we can use a 65-minute chart to calculate the 10 bar average range. It is important to use the average range of bars where each bar consists of the total number of smaller bars. If you were to use an average range where some of the bars consisted of less time, then the average would be in error. There are 6 hours and 30 minutes in each S&P day session. If we are using 60-minute bars to determine the 10 bar average, we must not use the last bar in the trading day in the calculation to determine the average range as it only consists of 30 minutes. It is important to know in advance how much any rally or decline must move before you consider using retracement levels.

If you are monitoring the average range of a longer timeframe in real time and it begins to compress, then a shallow retracement will probably be insignificant. Typically, the average range of a longer timeframe will not decrease. Knowing this, we can use the retracement level as a good indication of trend strength. If the market finds support with a shallow retracement (less than 38.2%) then prices should easily take out the previous high or low (if a bear market). When the retracement is deep (50% to 61.8%), it is an indication that the market is weak or weakening, and that the trend could be ending. Prices will find it difficult to take out the previous high if the market is rallying or low if the market is declining. Retracements of .618 to .854 show signs of extreme market weakness and should be viewed as an indication that the trend is probably reversing. A deep retracement also tells us that a longer timeframe has noticed the previous price movement and it was the longer timeframe traders who faded the move.

Before the trading day begins, it is important to examine the daily chart to be aware of key numbers that the longer-term traders are watching. Here are items to examine on the longer-term or daily chart:

<u>Daily Chart Exam for determining major trend.</u>

1. What are the major support and resistance numbers using prior rallies and declines?

2. Was there a reversing rally or decline? What was the major resistance/ support level?
3. What would be the price for a 38%, 50% or 66% retracement from the most recent rally high or decline low?
4. What is the 10-day average daily range?

30 Minute Chart Exam for determining the intermediate trend:

1. Is the market making higher highs and higher lows indicating an up-trend?
2. Is the market making lower lows and lower highs indicating a downtrend?
3. Is there an up or down move that approaches 100% of the 10-day average daily range?
    a. If true, the 30-minute timeframe traders are probably exhausted or over-extended.
    b. If the move is less than 100% of the daily average range, then we will focus our attention on the next smaller timeframe.

5-Minute Chart Exam for determining the short-term trend.

1. Has the price moved 40% of the 10-day average daily range?
    a. If true, we know the 5-minute traders are probably tired.
    b. Should the 5-minute chart be indicating an entry, we will drop to a 1-minute price behavior for our trigger.

Basic retracement theory is only applied when the market is trending up or down. If the market is choppily trading sideways, we should not use retracement theory. If price has moved 40% of the 10-day average range on a 5-minute chart, we can expect that the shorter timeframe traders are tired and that a shallow retracement is imminent. Should the retracement not be shallow, it is because the longer timeframe traders decided to fade the rally. In a 5-minute chart, a rally of more than 50% of the 10-day average range is a huge move and is usually indicating that a stronger trend will develop. However, a 50% move of the 10-day range in a 30-minute chart is only a moderate move.

Assuming that we have a solid uptrend that exceeds 50% of the 10-day daily average range on a longer timeframe (30-minute or daily) chart and see a retracement of less than 38% on the shorter timeframe 5-minute chart, then we must only trade in the direction of the intermediate trend.

Table # 9 – Trend Strength as Indicated by Percentage of Retracement:

Trend Strength	Maximum Retracements	Upside Targets (downside targets are inverse)	Comments:
Very Strong	14.6% to 23.7%	A to B added to C	Easily exceed B
Strong	38.2%	A to B added to C	Easily exceed B
Medium Strong	38.2% to 50%	80% of A to B added to C	Should Easily exceed B
Medium	50%	80% of A to B added to C	Should Easily exceed B
Medium Weak	61.8% to 50%	80% of A to B added to C	Possibly exceed B
Weak	61.8%	80% of A to B added to C	Possibly exceed B
Very Weak	85.4% to 76.3%	80% of A to B added to C	Probably will not exceed B

Chart # 1 - Basic Retracement Theory - using a 30 minute chart of cash S&P

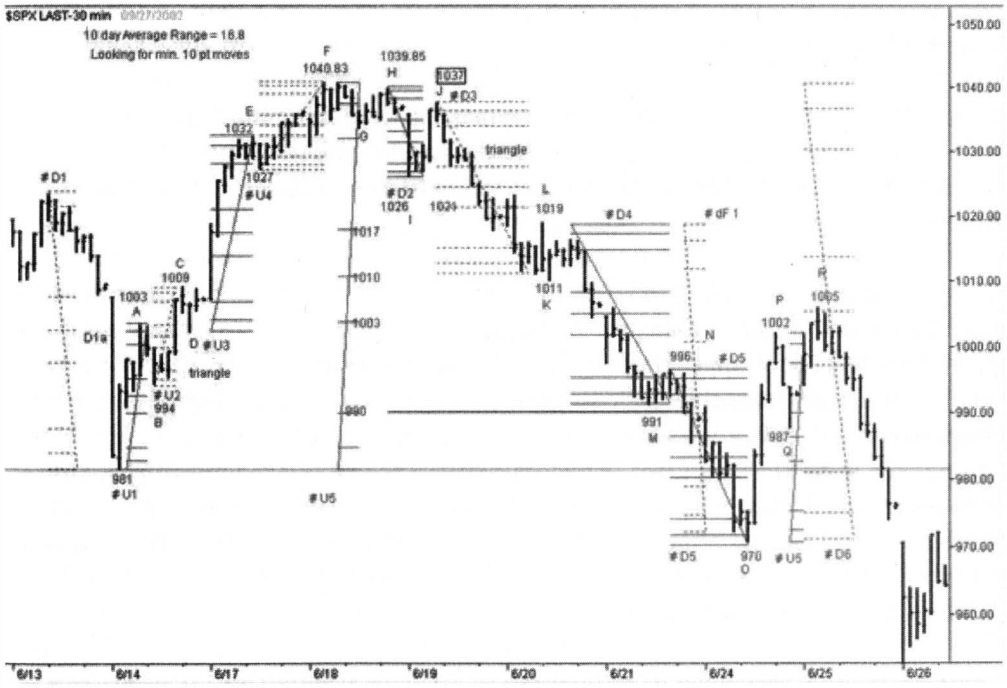

Chart # 1 – Description on the following page.

1. In retracement D1, prices collapsed from 1023 to 981. Then, prices rallied to D1a, which is a 50% retracement. We know that the strength of the bear market is only moderate from this retracement. We know that the high at point A should not be violated if the Bears are in charge.

2. At this point, we don't know who or what timeframe is in charge. We will draw another up retracement U1. We know that if the Bulls buy at a 38% retracement, then they are probably in charge. This is exactly what happens at 994 at point B. We can take the difference between 1003 and 981 to get an upside target of 22 points which is added to 994 giving us an upside target of 1016.

3. As prices rally to C at 1009, the Bulls encounter resistance. This coincides with the 61.8% retracement of D1 and a downside breakaway gap. Upon seeing the down close, we could draw another retracement U2 and we see that the Bulls defended the 31% and 50% level. The rally from point B to point C is very small and we shouldn't use it on this 30-minute chart.

4. The ensuing rally to point E totally negated the downtrend, D1, before encountering resistance at 1032. Once again in drawing our retracement levels, we can see that the Bulls prevented any retracement under 1027 (14.6%) telling us that the trend is very strong.

5. The rally from 1027 to 1040 is labored. We draw another retracement U4. The price behavior is different than previous tops at points A and C and to some degree point E. Notice the lack of upper shadows at F. Looking at retracements, we can see that at point G, the Bears were able to close under the 38% level and just above the 50% as the Bulls seemed to be on vacation. The trend has significantly weakened from "Very Strong" to "Medium." It is not "Medium Strong" because of the down close near the 50% retracement with an intra-bar low under 50%. At this point, should the Bulls fail to protect and prevent any price extension to the downside below point G, the rally would probably be over. Additionally, point G is important as an important swing point – notice the 2 higher lows on either side of it.

6. The Bulls managed to rally prices to 1039.85 at point H. Prices made a new intra-bar high at 1039.85 and failed to close above its open. At this point, we knew that the rally was probably over. When the Bears were able to close the market below point G and making a breakaway gap lower, the Bears were the dominant force. If we were trading in a smaller timeframe, we should have been short. However, in the 30-minute timeframe it is not apparent that the market had shifted. We must wait to see how the price behavior unfolds. Draw another retracement, U5, from the 981 low to the 1040 high. From this retracement, we can identify important support within the context of a longer timeframe.

7. As prices fall below point G, we begin drawing our new lower retracement D2. When prices establish a new low at 1026, we knew that the Bulls would be gunning for the breakaway gap and should they fail to close above that level, the market would collapse once again. We know this because there were no other significant retracement levels nearby. The nearest long term support on U5 was 1017. This indicates that the low of 1026 was only a temporary low.

8. As the Bulls rushed to close the breakaway gap in the 1036 area, the market closed above the 61% retracement level. The last significant resistance area for the Bulls was at 85%, which the Bulls were unable to hit. From this information, we know that the Bears will probably hit the 1017 target and possibly 1010.

9. When prices fell under point I at 1026, it was possible that we were at the beginning of a major bear market if the Bulls failed to defend support at 1017 (38% buy retracement), or 1010 (50%). Prices continued to fall finding temporary support at 1017 and finally coming to a halt at 1011. Drawing our new retracement D3, we can see that our 38% sell retracement would be at 1021. On the next bar, the Bulls rally prices to 1019 before closing just off of the intra-bar low. For the next 3 bars, the Bulls are unable to close above the 14.6% sell retracement level. At this point, we know that the spike to 1019 was nothing more than a bull rally in a smaller timeframe than 30 minutes. We know that the bear trend is "very strong" with no close above the 14.6% retracement. In addition, we know that the bear market would become major as 1010 level was the 50% retracement of the previous rally. If the Bulls were going to buy, NOW was the time. The fact that they abandoned ship was all too obvious by the large black candle that closed under 1011. When prices closed under 1011, we knew that the Bears were dominant and would push prices towards a target of 993 as calculated by [1019-(1037-1011)]. This price was close enough to the 61% retracement level of the previous bull rally that it confirmed that prices would hit 990 before finding any support.

10. Prices hit a low of 991 at point M. Then, they stayed in the 14.6% retracement level before selling off once again. The close above the 14.6% retracement line is ignored because it is so close to that level. We can once again project the new low to 968 from [996-(1019-991)]. Price once again hits the target. The low at point M (991) was significant as many traders began thinking that perhaps a double bottom was forming. However by using basic retracement theory, we could tell that the bear market trend was <u>still</u> "very strong." Why would anyone even think about buying it?

11. Prices broke through major support at 981 stopping out all of the long traders who thought a double bottom was forming and found support at 970. This is where we forecast the low using retracement theory. The next bar saw the Bulls buying the market pushing prices back above 981 retracing 50% of the prior plunge in one bar. At

this point, we would draw our retracement levels, D5, and because it could also be a significant low we would draw a retracement level D6. Prices rallied to 1002 after they rallied above 986, which was the 61.8% retracement for D5. At this time, we knew that the Bear trend had changed from "very strong down" to "weak." Here we begin to focus our attention on retracement level D6.

12. Prices rallied to point P at 1002 before encountering resistance. This price was just above the 31.8% retracement level of D6 and the 61.8% level. From our analysis, we know there is a very good possibility that the Bears in the longer timeframe than 30-minutes were once again going short - just as the Bulls should have defended 1017, 1010, and 1003. Look at the chart and compare the price action at points P and R versus point K. In any case, once we see the down close we draw up retracement level U5. In the next bar, prices collapse to point Q at 987 where we find Bulls that push prices higher as indicated by the 'hammer' formation. The 50% re-test level of U5 was 986. We can determine the upside target of 1002 from [1002-987)+987].

13. Prices rallied to point R at 1005, which was the 50% re-test level of the major decline D6. It is at this point that the Bears must prevent the Bulls from pushing prices higher and should start hitting the bid in their rush to get short.