TECHNICAL ANALYSIS EXPLAINED

Patterns
(Elliott wave)

Momentum
(Rate-of-change)

Trend
(Moving average)

Technical analysis
- is governed by a system of rules and guidelines
- provides objectiveness in the decision-making process
- is fast to apply (once skills are learned)
- is applicable across all time frames
- is applicable to all markets
- generally pre-empts fundamental data
- has been proven in the market for over 200 years
- is FUN and can earn you MONEY.

February 1999

Technical Analysis - Explained

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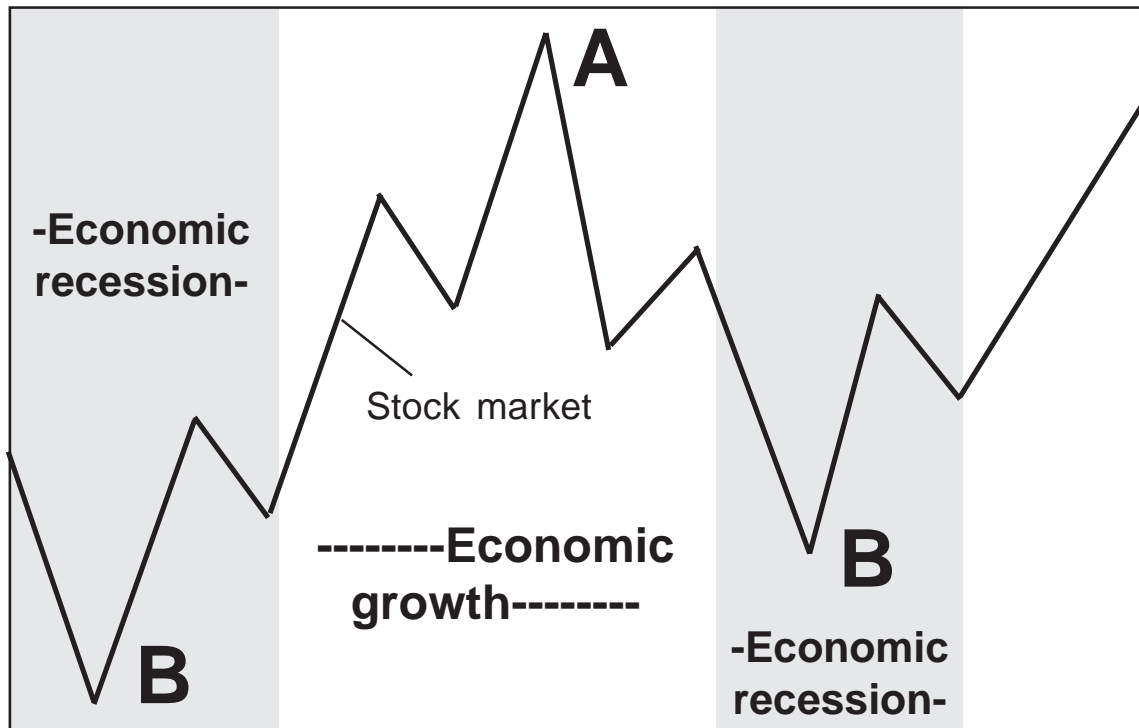

What is technical analysis?

Technical analysis is the study of financial market action. The technician looks at price changes that occur on a day-to-day or week-to-week basis or over any other constant time period displayed in graphic form, called charts. Hence the name chart analysis.

A chartist analyzes price charts only, while the technical analyst studies technical indicators derived from price changes in addition to the price charts.

Technical analysts examine the price action of the financial markets instead of the fundamental factors that (seem to) effect market prices. Technicians believe that even if all relevant information of a particular market or stock was available, you still could not predict a precise market "response" to that information. There are so many factors interacting at any one time that it is easy for important ones to be ignored in favor of those that are considered as the "flavor of the day."

The technical analyst believes that all the relevant market information is reflected (or discounted) in the price with the exception of shocking news such as natural distasters or acts of God. These factors, however, are discounted very quickly.

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Technical Analysis - Explained

Technical analysis pre-empts fundamental data

Fundamentalists believe there is a cause and effect between fundamental factors and price changes. This means, if the fundamental news is positive the price should rise, and if the news is negative the price should fall. However, long-term analyses of price changes in financial markets around the world show that such a correlation is present only in the short-term horizon and only to a limited extend. It is non-existent on a medium- and long-term basis.

In fact, the contrary is true. The stock market itself is the best predictor of the future fundamental trend. Most often, prices start rising in a new bull trend while the economy is still in recession (position B on chart shown above), i.e. while there is no cause for such an uptrend. Vice versa, prices start falling in a new bear trend while the economy is still growing (position A), and not providing fundamental reasons to sell. There is a time-lag of several months by which the fundamental trend follows the stock market trend. Moreover, this is not only true for the stock market and the economy but also for the price trends of individual equities and company earnings. Stock prices peak ahead of peak earnings while bottoming ahead of peak losses.

The purpose of technical analysis is to identify trend changes that precede the fundamental trend and do not (yet) make sense if compared to the concurrent fundamental trend.

Technical Analysis - Explained

G
R
E
E
D

F
E
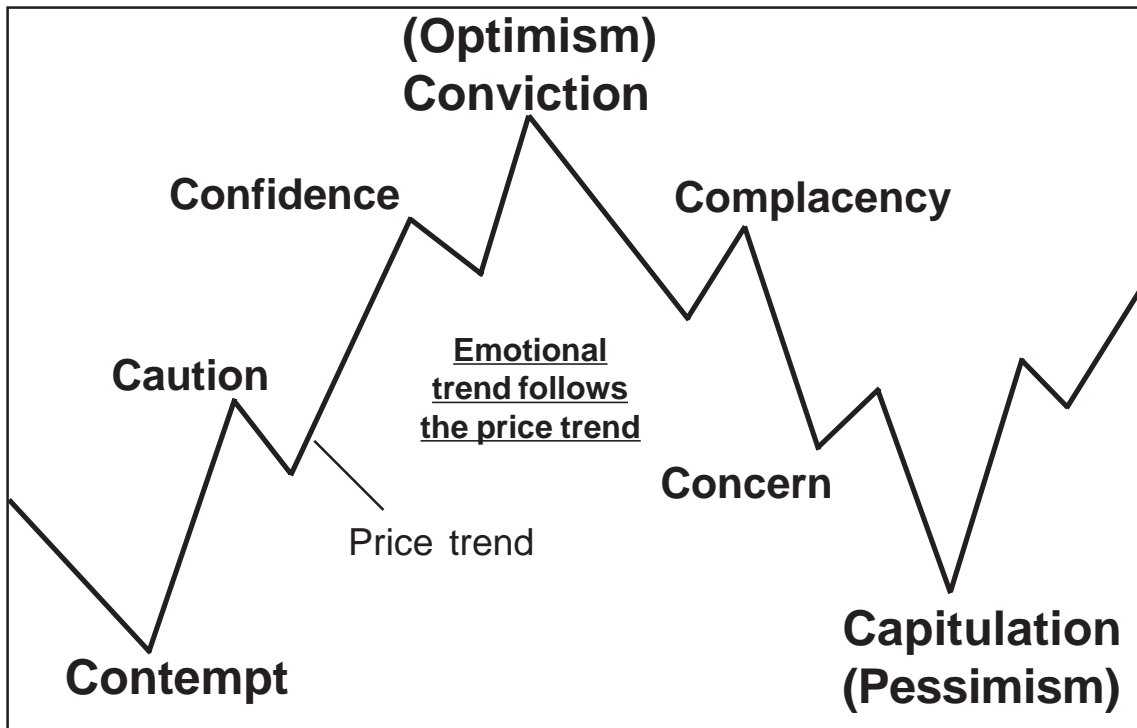A
R

Mood is stronger than ratio

<u>Know yourself and knowledge of the stock market will soon follow</u>. Ego and emotions determine far more of investors´ stock market decisions than most would be willing to admit.

For years, we have dealt with professional money managers and investment committees and found they were as much subject to crowd following and other irrational emotional mistakes as any novice investor. They were, for the most part, better informed, but facts alone are not enough to make profitable decisions. The human element, which encompasses a range of emotions from fear to greed, plays a much bigger role in the decision-making process than most investors realize.

In a practical sense, most investors act exactly opposite to the rational wisdom of buying low and selling high based on very predictable emotional responses to rising or falling prices. Falling prices that at first appear to be bargains generate fear of loss at much lower prices when opportunities are the greatest. Rising prices that at first appear to be good opportunities to sell ultimately lead to greed-induced buying at much higher levels. Reason is replaced by emotion and respective rationalization with such cyclical regularity, that those who recognize the symptoms and the trend changes on the charts can profit very well from this knowledge.

Historically, this has always been indicative of the markets.

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Technical Analysis - Explained

(Optimism) Conviction

Confidence

Complacency

Caution

Emotional trend follows the price trend

Concern

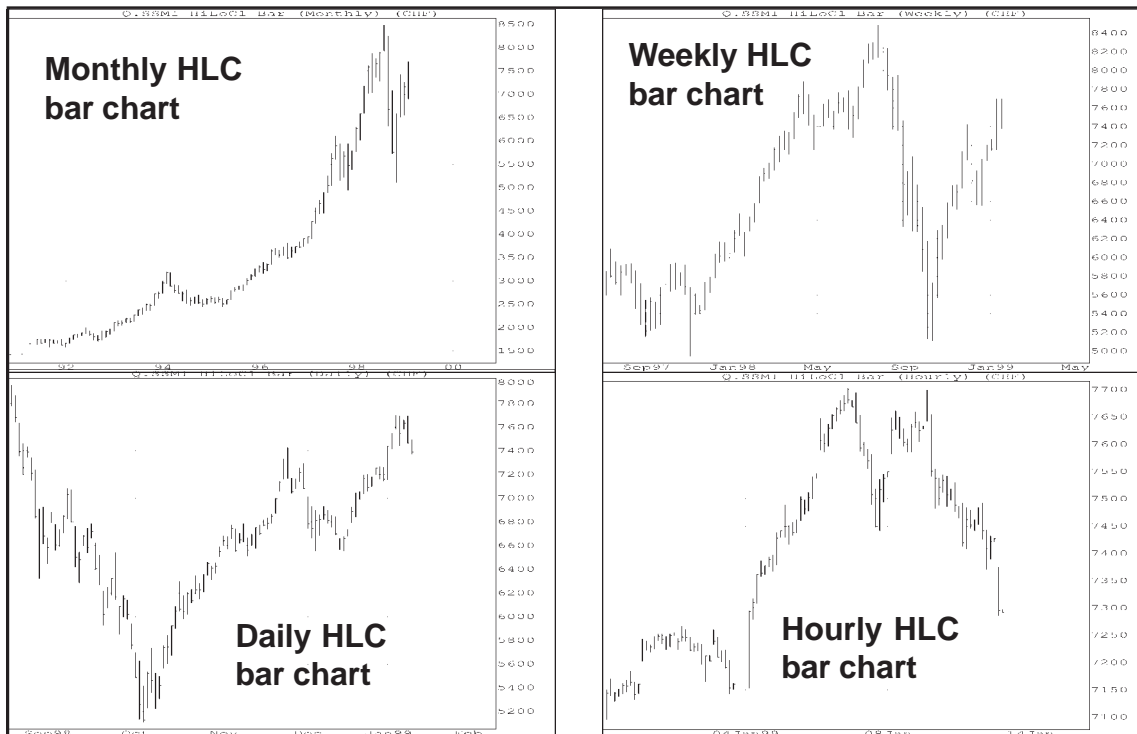Price trend

Contempt

Capitulation (Pessimism)

Optimism, pessimism, greed and fear

Why aren´t more people making more money in the stock market? Because, as we have seen, people are motivated by greed (optimism) when buying and by fear (pessimism) when selling. People are motivated to buy and sell by changes in emotion from optimism to pessimism and vice versa. They formulate fundamental scenarios based on their emotional state (a rationalization of the emotions), which prevents them from realizing that the main drive is emotion.

The chart above shows that if investors buy based on confidence or conviction (optimism) they BUY near or at the TOP. Likewise, if investors act on concern or capitulation (pessimism) they SELL near or at the BOTTOM. Investors remain under the bullish impression of the recent uptrend beyond the forming price top and during a large part of the bear trend. Vice versa, they remain pessimistic under the bearish impression from the past downtrend through the market bottom and during a large part of the next bull trend. They adjust their bullish fundamental scenarios to bearish AFTER having become pessimistic under the pressure of the downtrend or AFTER having become optimistic under the pressure of the uptrend. Once having turned bearish, investors formulate bearish scenarios, looking for more weakness just when it is about time to buy again. The same occurs in an uptrend when mood shifts from pessimism to optimism. Investors formulate bullish scenarios AFTER having turned bullish, which is after a large part of the bull trend is already over. Emotions are the drawback of fundamental analysis.

Investors must learn to <u>buy</u> when they are <u>afraid</u> (pessimistic) and <u>sell</u> when they feel <u>euphoric</u> (optimstic). This may sound easy (simple contrary opinion), but without charts it is hard to achieve. <u>The main purpose of technical analysis is to help investors identify turning points which they cannot see because of individual and group psychological factors.</u>

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Technical Analysis - Explained

Monthly HLC bar chart

Weekly HLC bar chart

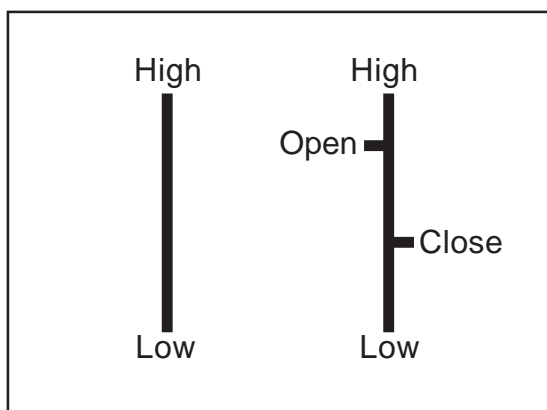**Daily HLC bar chart**

Hourly HLC bar chart

Bar charts

Four bar charts of the Swiss Market Index are shown above. They are the most widely used chart types.

The <u>bar charts</u> are:
  High-low charts or
  High-low-close charts or
  Open-high-low-close charts

High   High

Open

Close

Low   Low

One single bar shows the high and the low of the respective trading period. A vertical bar is used to connect the high and the low. Horizontal lines are used to show the opening price (left) of that specific trading period and the closing price (right) at the end of the period. For example, on the monthly chart a bar indicates the high and the low at which the dollar traded during that single month.

Line charts

Sometimes we use <u>line charts</u>, especially for Elliott wave analysis. A line chart is the simplest of all methods. It is constructed by joining together the closing price of each session.

Daily closing line chart

Technical Analysis - Explained
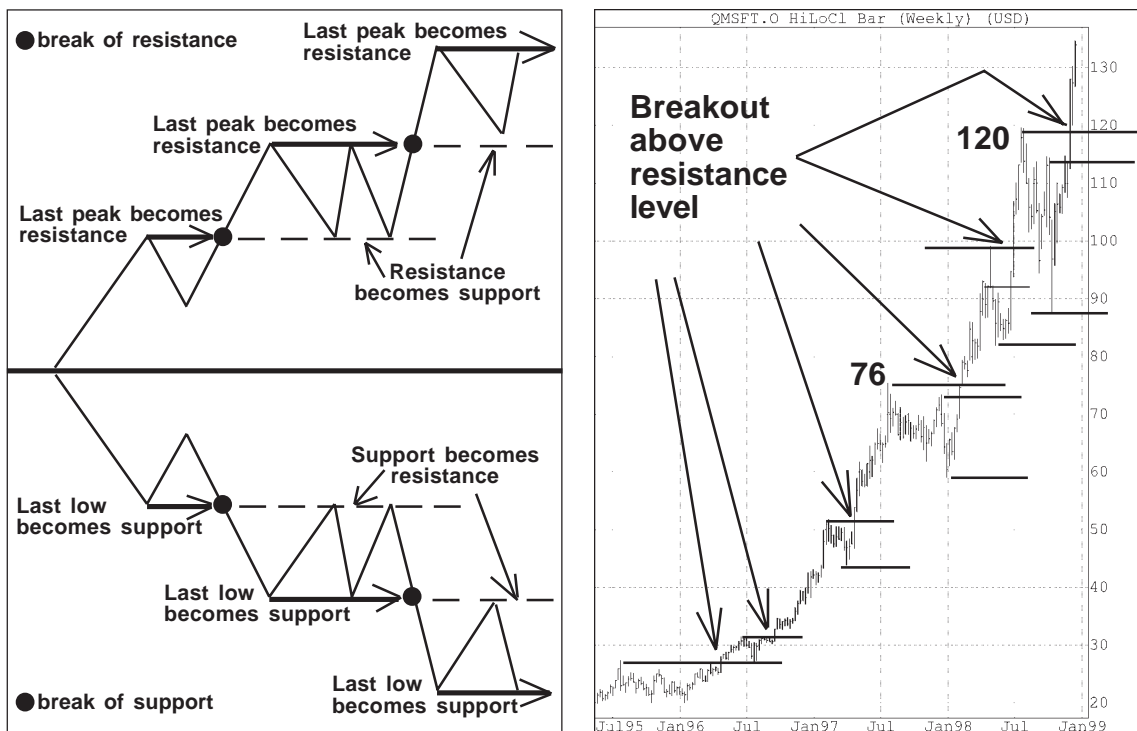

Support and resistance

Resistance lines are <u>horizontal lines</u> that start at a recent extreme price peak with the line pointing horizontally into the future. Support lines are <u>horizontal lines</u> that start at a recent extreme of a correction low and also point toward the future on the time axis. An uptrend continues as long as the most recent peak is surpassed and new peak levels are reached. A downtrend continues as long as past lows are broken, sustaining a series of lower lows and lower highs. Notice that the previous support often becomes resistance and resistance becomes support. A resistance or a support line becomes more important and its break gains more credibility as the number of price extremes (peaks for resistance; or lows for support) that can be connected by a single line increases.

Some examples for Microsoft are shown on the chart above. Microsoft reached a high of 76 in July 1997. The price started to correct from there and Microsoft remained below this level until February 1998. The 76 level became the resistance, meaning that only if 76 (the highest peak so far in the uptrend) had been broken on the upside could the stock have confirmed its uptrend. The same is true for the peak at 120 in July 1998. The uptrend was confirmed when the price rose above this resistance in November 1998.

Support levels are positioned at 20, 27, 43, 59, 82 and 87. As long as the price pushes above past peaks (resistance levels) and holds above past support levels (does not break them) the uptrend remains intact. The same is true for the bear trend. The downtrend remains intact as long as the price falls below the recent lows (support levels) and fails to rise above past resistance levels.
A bearish trend reversal occurs when the price breaks the most recent support after having failed to rise above the most recent resistance. A bullish trend reversal occurs when the price penetrates the most recent resistance after having held above the most recent support.

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Technical Analysis - Explained
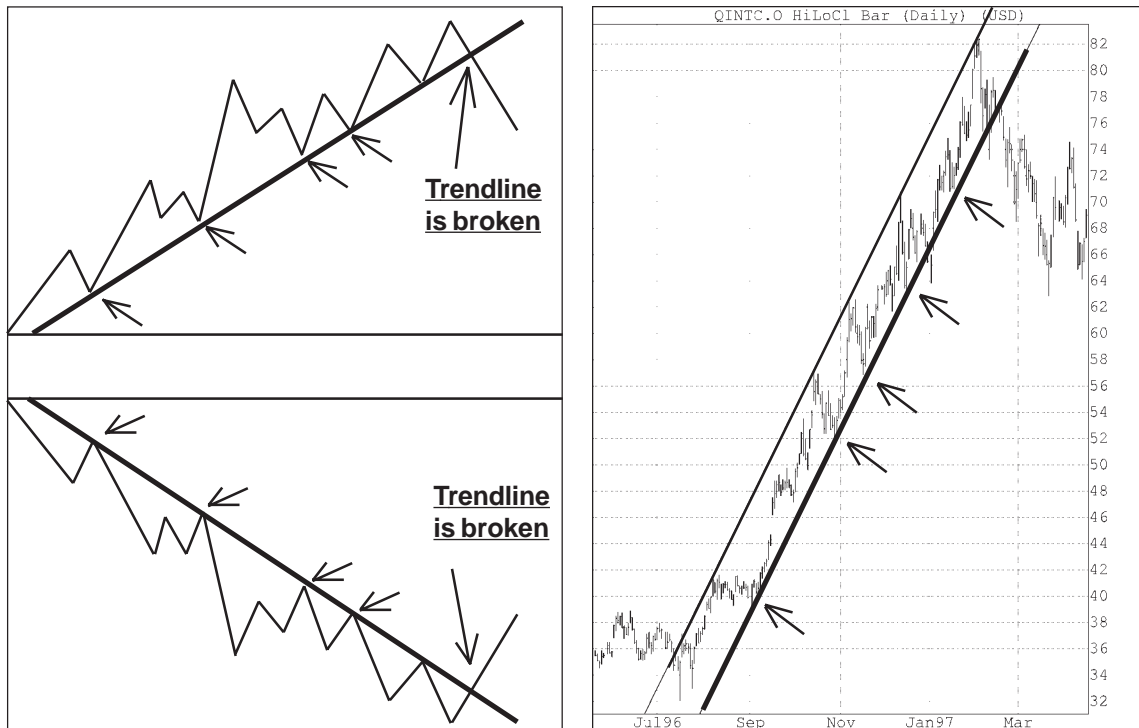
Trendlines

Resistance levels can either be drawn by vertical lines (as discussed on the previous page) or can be uptrending or downtrending lines.
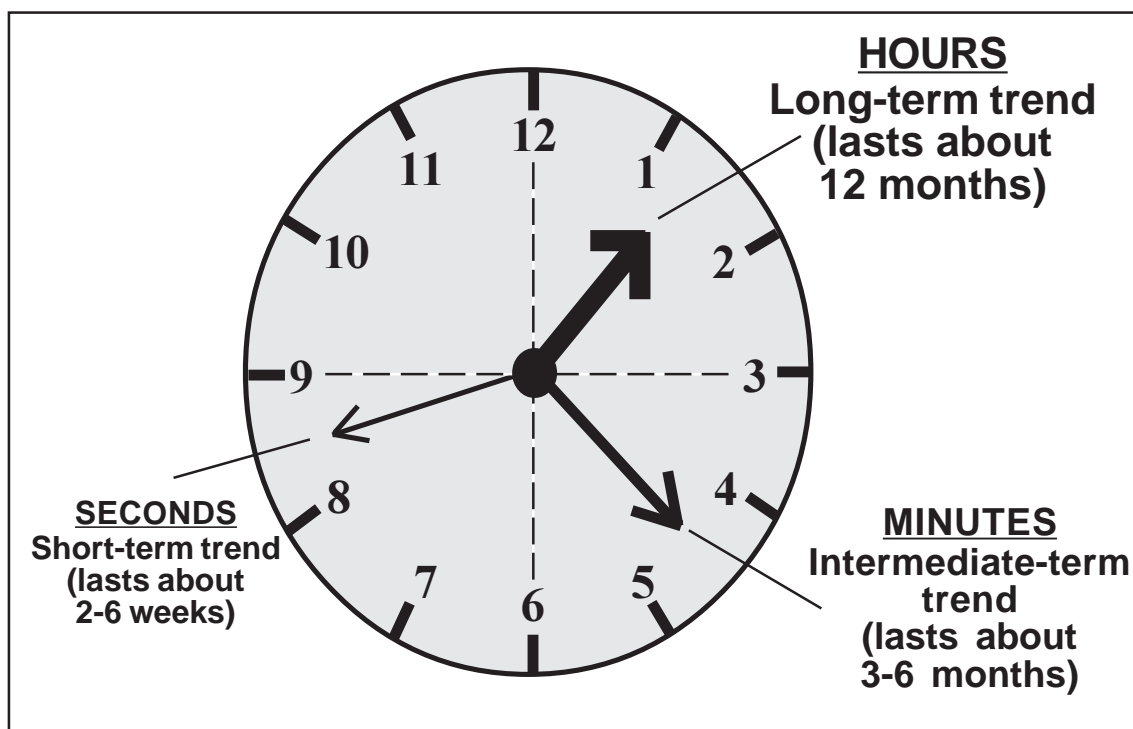
The trendline is nothing more than a straight line drawn between at least three points. In an upmove the low points are connected to form an uptrend line. For a downtrend the peaks are connected. The important point is that it should not be drawn over the price action. Trendlines must encorporate all of the price data, i.e. connect the highs in a downtrend and the lows in an uptrend. The closing prices are not connected.
The trend line becomes more important and gains credibility as the number of price extremes that can be connected by a single line increases. The validity and viability of a line that connects only two price extremes (for example the starting point and one price low) is questionable.

The trend is broken when the price falls below the uptrend line or rises above the downtrend line. Some analysts use a 2-day rule, meaning that the trend is only seen as broken if the price closes above/below the trendline for at least two days. Others use a 1% stop (could be higher depending on market volatility), meaning the trend is only seen as broken if the price closes over 1% above/below the trendline.

The chart above shows Intel´s rise from July 1996 to March 1997. Based on the uptrend line, investors would have held onto the position from around 38/40 until 66 or even 74/76. Most often investors take profits much too early. Stay with a trend until it is broken.

Technical Analysis - Explained

HOURS
Long-term trend
(lasts about
12 months)

MINUTES
Intermediate-term
trend
(lasts about
3-6 months)

SECONDS
Short-term trend
(lasts about
2-6 weeks)

Investment horizons

The charts on the previous pages show that investors require perspective. It is imperative to differentiate between a short-term, a medium-term and a long-term trend. If somebody tells you to buy the US dollar because it is likely to rise, make sure you understand whether the dollar is expected to rise over a few days or a few months and if you should buy the dollar with the intention to hold it for several days, several weeks or several months.

For a technician on the trading floor, the long-term horizon is entirely different from that of an institutional investors. For a trader long-term can mean several days, while for the investor it can mean 12 to 18 months.

We can compare the charts and indicators to a clock (shown above). Short-term trends (the seconds) are best analyzed on daily bar charts. Medium-term trends (the minutes) are best seen on weekly bar charts and long-term trends (the hours) are best seen on monthly bar charts. Some investors only want to know the hour, some want to know the seconds and some want to know the exact time.
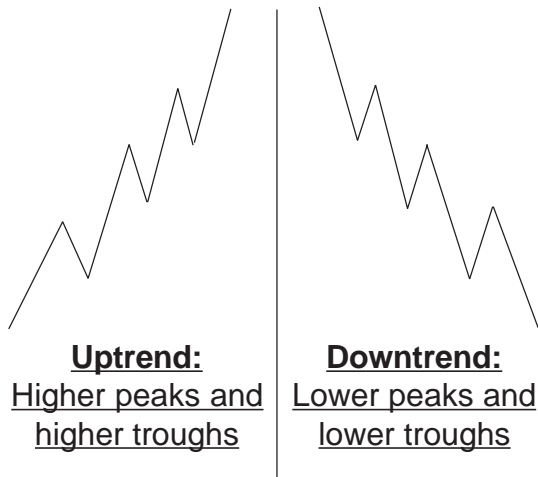
The best investment results are achieved when all three trends on the daily, weekly and monthly charts point in the same direction.

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Technical Analysis - Explained

QDEM= HiLoCl Bar (Weekly)

What trend?

The chart above shows three US dollar/German mark trends.

Uptrend:
Higher peaks and higher troughs

Downtrend:
Lower peaks and lower troughs

Sideways trend or consolidation:
Horizontal peaks and troughs

1) The uptrend from 1995 to 1997 is **long term**. It is also called the PRIMARY trend. It was broken by the 1998-decline. The long-term uptrend is not a straight line, but is interrupted by corrections of a smaller degree.
2) These corrections are the **medium-term** or intermediate-term trends. They are also called SECONDARY trends. The medium-term correction is also not a straight line but is made up of smaller corrections.
3) These smaller trends are the **short-term** trends. They are also called MINOR trends.

A minor downtrend can be part of an intermediate-term uptrend which itself can be part of a longer-term primary downtrend. Sometimes it is difficult to differentiate between a short- and a medium-term or a long-term trend. Therfore, we need support from the technical indicators.

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Technical Analysis - Explained

| Day	Close	5-day Total	5-day Average	Day	Close	5-day Total	5-day Average
1	50	x	x	21	48	171	34.2
2	55	x	x	22	40	186	37.2
3	57	x	x	23	43	199	39.8
4	60	x	x	24	41	205	41
5	65	287	57.4	25	35	207	41.4
6	70	307	61.4	26	39	198	39.6
7	66	318	63.6	27	35	193	38.6
8	60	321	64.2	28	37	187	37.4
9	50	311	62.2	29	25	171	34.2
10	54	300	60	30	18	154	30.8
11	45	275	55	31	35	150	30
12	43	252	50.4	32	50	165	33
13	33	225	45	33	40	168	33.6
14	40	215	43	34	45	188	37.6
15	35	196	39.2	35	50	220	44
16	30	181	36.2	36	70	255	51
17	25	163	32.6	37	70	275	55
18	30	160	32	38	60	295	59
19	35	155	31	39	75	325	65
20	33	153	30.6	40	70	345	69

Moving averages

Moving averages are popular and versatile for identifing price trends. They smooth out fluctuations in market prices thereby making it easier to determine underlying trends.

Their other function is to signal significant changes in direction as early as possible.

The simple moving average is the most widely used. Its calculation is shown above in mathematical form and displayed in the chart on the right.

For a 5-day moving average you simply add the closing prices of the last five closings and divide this sum by 5. You add each new closing and skip the oldest. Thus, the sum of closings always remains constant at 5 days.

Price & 5-day moving average
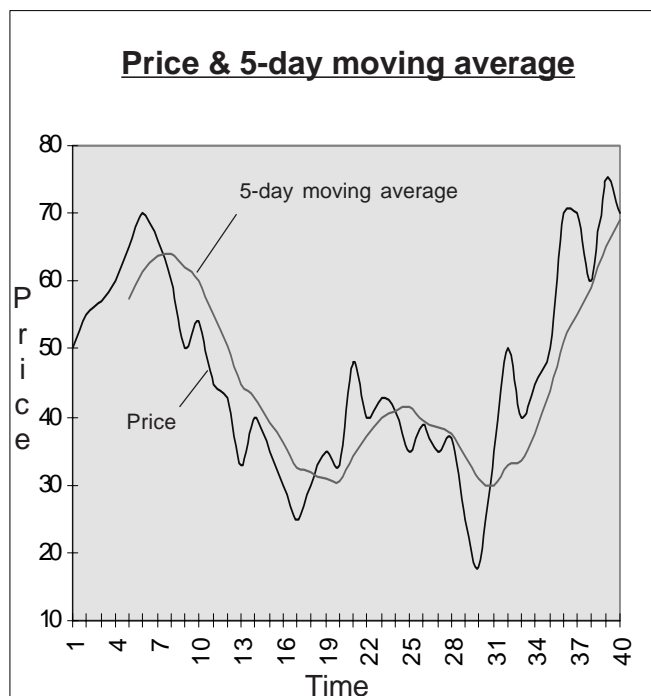
Whether you choose a 10-day average or a 40-week average the calculation is the same; instead of adding five days you add 10 days or 40 weeks and divide the sum by 10 or 40, respectively.

Technical Analysis - Explained

Q.DJI HiLoCl Bar (Daily)
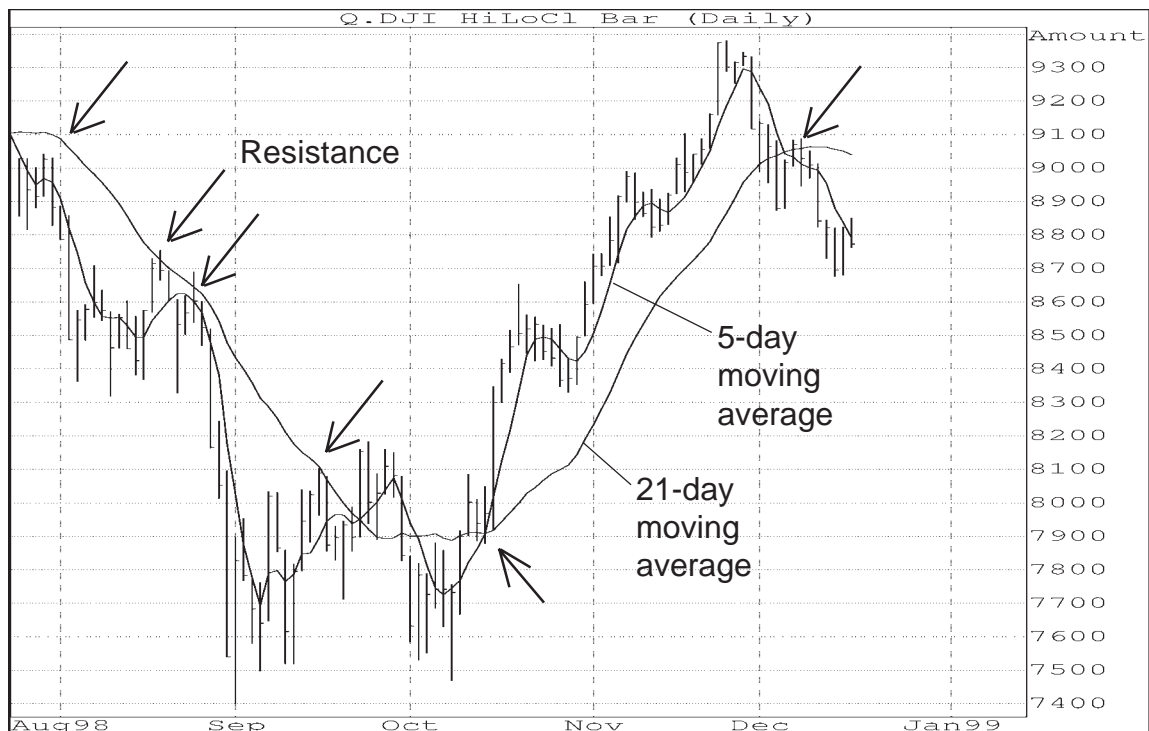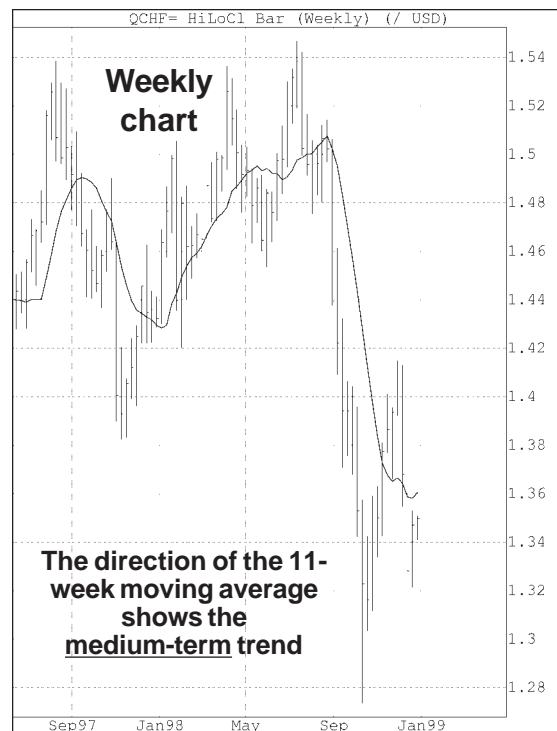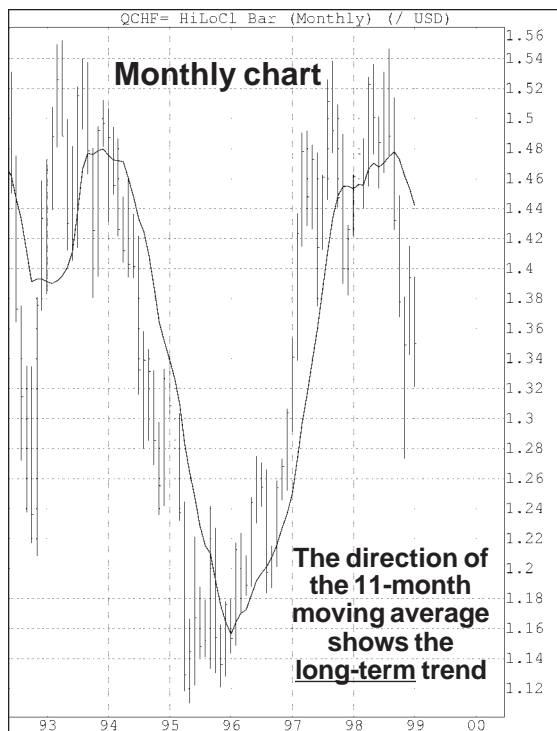
The simple moving average

The simple moving average yields a mean of data for a given period. For example: a 21-day simple moving average (SMA) would include the last 21 days of data divided by 21 resulting in an average (see chart above for the Dow Industrial Index). This can be calculated at any given time using the last 21 days, hence, the average moves foreward with each trading day. The moving average is usually plotted on the same chart as price movements so a change in direction of trend can be indicated by the penetration/crossover of the SMA. Generally a buy signal is generated when a price breaks above the moving average and a sell signal is generated by a price break below the moving average. It is added confirmation when the moving average line turns in the direction of the price trend.

The moving average naturally lags behind price movement, and the extent by which it lags (or its sensitivity) is a function of the time span. Generally, the shorter the moving average the more sensitive it is. A 5-day moving average will react more quickly to a change in price than a 20-day moving average for example. However, the 5-day moving average is more likely to give false signals and "whipsaw" than the 20-day one, which gives signals later and suffers from opportunity loss.

Generally, if the market is trending (in an uptrend or downtrend) a longer time period would be used. If it is ranging (consolidating) the shorter time frame will catch the minor moves more easily.
Moving averages can act as support and resistance (as shown by the arrows on the chart above for the Dow Jones Industrial Index), similar to the support and resistance discussed on pages 8 and 9.

Technical Analysis - Explained

QCHF= HiLoCl Bar (Monthly) (/ USD)

Monthly chart

The direction of the 11-month moving average shows the long-term trend

QCHF= HiLoCl Bar (Weekly) (/ USD)

Weekly chart

The direction of the 11-week moving average shows the medium-term trend

Long-term, medium-term and short-term averages

We incorporate three basic moving averages to track the three investment horizons as discussed on page 10. They are shown on the three charts on this page.

On the monthly chart above, the 11-month moving average tracks the long-term trend. On the weekly chart above, the 11-week moving average tracks the medium-term trend.
On the daily chart on the right, the 11-day moving average tracks the short-term trend. The direction of the moving averages indicates the direction of the three basic trends in force.

Instead of using three separate charts to illustrate the three basic trends, we often use a daily chart displaying all three moving averages. On the daily chart the 11-month moving average equals the 233-day moving average, the 11-week average equals the 55-day average and the 11-day remains the 11-day moving average. This is shown on the next page.

QCHF= HiLoCl Bar (Daily) (/ USD)

Daily chart

The direction of the 11-day moving average shows the short-term trend

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Technical Analysis - Explained


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QCHF= HiLoCl Bar (Daily)  (/ USD)
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The best performance is achieved when the st is rising above the mt and both are rising above the lt moving average (see also page 20).

Short-term downtrend

Short- and medium-term uptrend

S1

S1

S2

S2

B1

B2

S1

S2

Medium-term downtrend

Long-term uptrend being broken

S3

B3

11-day moving average
55-day moving average
233-day moving average

```
1.54
1.52
1.5
1.48
1.46
1.44
1.42
1.4
1.38
1.36
1.34
1.32
1.3
1.28
1.26
1.24
1.22
1.2
```

Nov96   Jan97   Mar   May   Jul   Sep

Moving average crossover

The three moving averages discussed on the previous page are shown again here on the daily chart. The 11-day moving average (short-term trend), the 55-day moving average (medium-term trend) and the 233-day moving average which tracks the long-term trend (we also track the more popular 200-day moving average). Displaying the three moving averages on one chart provides important signals based on the moving average cross-overs.

BUY and SELL signals are given
        - when the price crosses the moving average
        - when the moving average itself changes direction and
        - when the moving averages cross each other

A short-term buy signal (B1) is given when the price rises above the 11-day moving average; the buy signal is confirmed when the 11-day average itself starts rising. The sell signals (S1) are given in the opposite direction.
A medium-term buy signal (B2) is given when the price climbs above the 55-day moving average and is confirmed when the 55-day average starts rising and the 11-day average crosses above the 55-day average. The sell signals (S2) are given in the opposite direction.
A long-term buy signal (B3) is given when the price rises above the 233-day moving average; the signal is confirmed when the 233-day average itself starts rising and the 55-day average crosses above the 233-day moving average. The sell signals (S3) are given in the opposite direction.

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Technical Analysis - Explained

| Day	Close	Difference from 5 days earlier		Day	Close	Difference from 5 days earlier
1	50			21	48	18
2	55			22	40	15
3	57			23	43	13
4	60			24	41	6
5	65			25	35	2
6	70	20		26	39	-9
7	66	11		27	35	-5
8	60	3		28	37	-6
9	50	-10		29	25	-16
10	54	-11		30	18	-17
11	45	-25		31	35	-4
12	43	-23		32	50	15
13	33	-27		33	40	3
14	40	-10		34	45	20
15	35	-19		35	50	32
16	30	-15		36	70	35
17	25	-18		37	70	20
18	30	-3		38	60	20
19	35	-5		39	75	30
20	33	-2		40	70	20

Momentum

In physics, momentum is measured by the rate of increase and decrease in the speed of an object. In financial markets it is measured by the speed of the price trend, i.e. whether a trend is accelerating or decelerating, rather than the actual price level itself.

Moving averages are lagging indicators and give signals *after* the price trend has already turned. Momentum indicators lead the price trend. They give signals *before* the price trend turns.

Once momentum provides a signal it has to be confirmed by a moving average crossover.

Price & 5-day rate of change

Instead of calculating the moving average of the **sum** of 5 days (see page 12) we calculate the **difference** over a constant 5-day period for a 5-day rate of change. This is shown on the chart above together with the zero line. If today´s price is higher than five days ago the indicator is positive, i.e. above the zero line. If the price continues to rise compared to five days earlier, the indicator rises. If the price today is lower than five days ago the indicator is negative, i.e. below the zero line. The rate of change oscillator is rather volatile. Therefore, we have smoothed it out (see thick-curved line) so that it provides easy-to-read directional change signals as explained on the next page.

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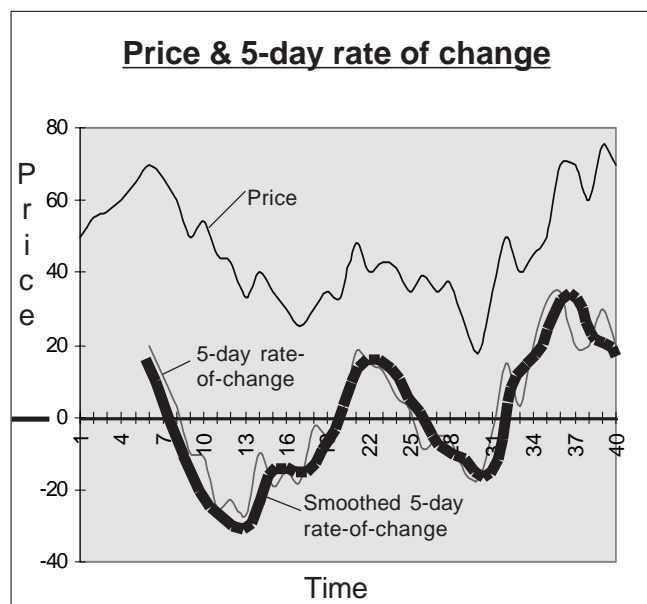
Technical Analysis - Explained
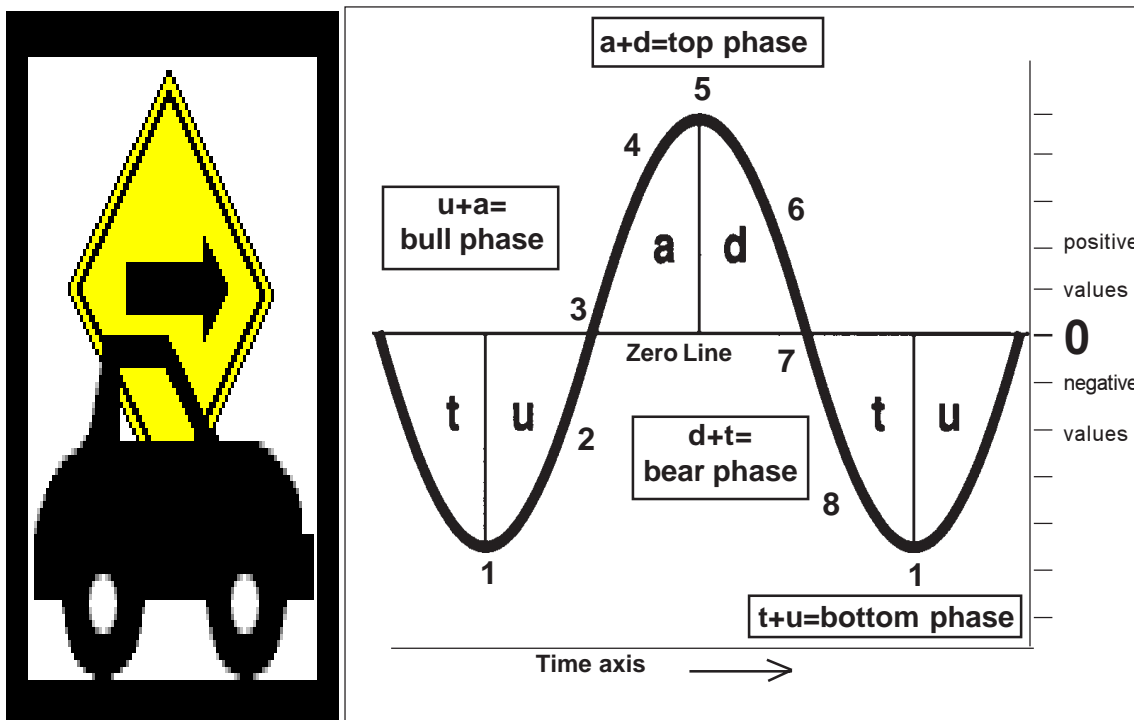
Momentum indicator signals

The principle of momentum applies exactly the same to driving a car as to price movements. When prices rise and the momentum indicator also rises the price uptrend accelerates. When prices rise and the indicator falls the price uptrend decelerates. When prices fall and the momentum indicator falls the price downtrend accelerates. When prices fall and the indicator rises the price downtrend decelerates. Therefore, momentum indicators have to be applied together with trend indicators (moving averages).
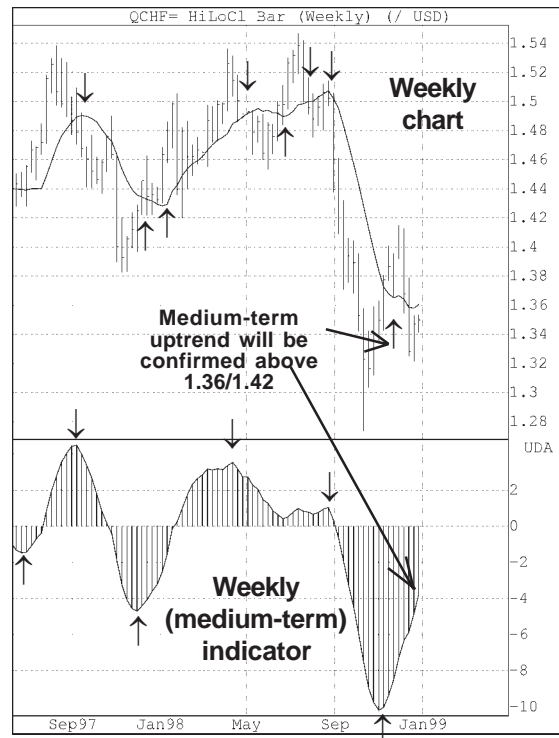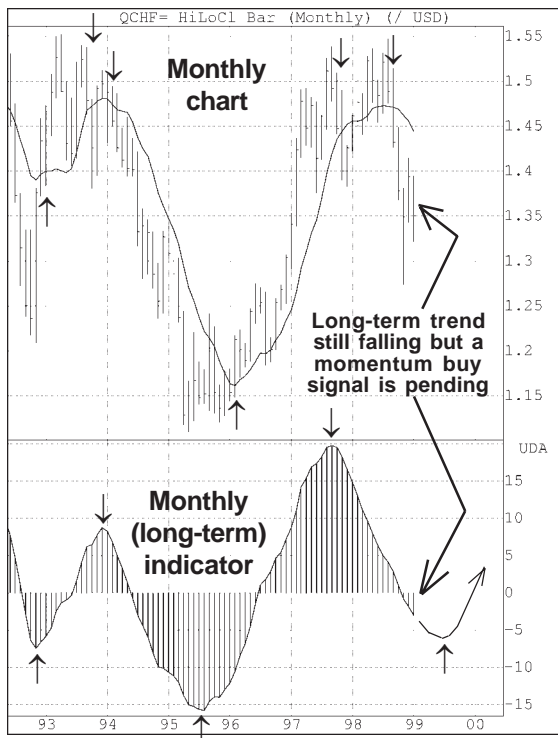
The momentum oscillator can be in one of four quadrants: Up quadrant (**u**): Oscillator rising towards the zero line. Advancing quadrant (**a**): The oscillator is moving up from zero. Down quadrant (**d**): The oscillator is moving down to zero. Terminating quadrant (**t**): The oscillator is moving down from zero.

The indicator is shown above in an idealized form (bell curve). The same form applies on monthly, weekly or daily charts to identify the long- medium- and short-term trend. It is the length of the time axis that differentiates the three time horizons. A real-time example is shown on the next page for IBM on the weekly chart.

1) The indicator is shifting from the "t"erminating phase to the "u"p phase, i.e reversing upwards <u>at</u> an oversold level. Expect a price <u>up</u>trend to start. **Buy.**
2) The indicator is rising through the "u"p phase towards the zero line, i.e. the indicator is becoming neutral: Expect the <u>up</u>trend to continue. **Add to longs**!
3) The indicator crosses above the zero line. It is shifting from the "u"p phase to the "a"dvancing phase. An uptrend reversal is unlikely. Expect the <u>up</u>trend to continue: **Hold**! **4)** The oscillator rises through the "a"dvancing phase <u>towards</u> the over-bought level. Expect the <u>up</u>trend to enter the top soon. **Get ready to sell**! **5)** The indicator is shifting from the "a"dvancing phase to the "d"own phase. The indicator is reversing downwards at an overbought level. Expect a new price <u>down</u>trend to start. **Liquidate longs. Sell short**!
6) The indicator is declining through the "d"own phase towards the zero line. Expect the <u>down</u>trend to continue. **Add to shorts**! **7)** The indicator crosses below the zero line. It is shifting from the "d"own phase to the "t"erminating phase. Expect the <u>down</u>trend to continue: **Hold short**! **8)** The oscillator falls through the "t"erminating phase towards the oversold level. Expect the <u>down</u>trend to bottom out soon. **Get ready to buy**! Buy when a reversal from "t" to "u" occurs.

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Technical Analysis - Explained


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QCHF= HiLoCl Bar (Monthly) (/ USD)
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Monthly chart

Long-term trend still falling but a momentum buy signal is pending

Monthly (long-term) indicator


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QCHF= HiLoCl Bar (Weekly) (/ USD)
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Weekly chart

Medium-term uptrend will be confirmed above 1.36/1.42
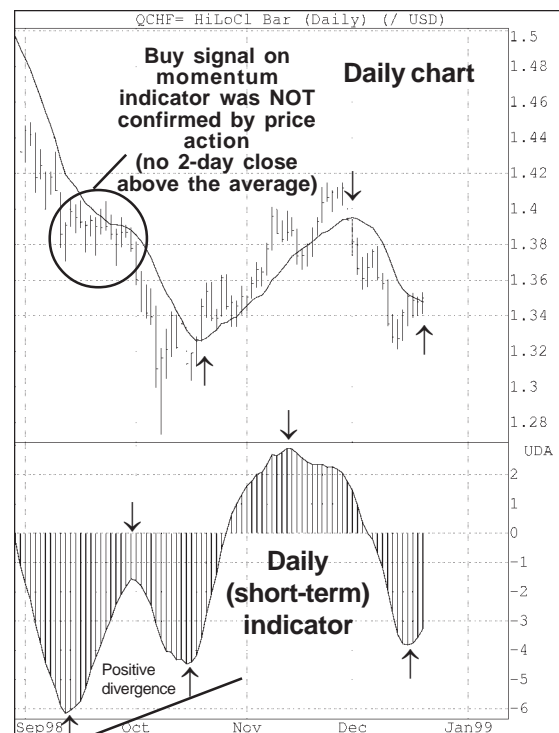
Weekly (medium-term) indicator

Long-term, medium-term and short-term indicators

We incorporate three momentum indicators to track the three investment horizons as discussed on page 10. The monthly or long-term momentum indicator tracks the long-term trend. The weekly, medium-term or intermediate-term momentum indicator (three expressions for the same indicator) tracks the medium-term trend while the daily or short-term momentum indicator tracks the short-term trend.
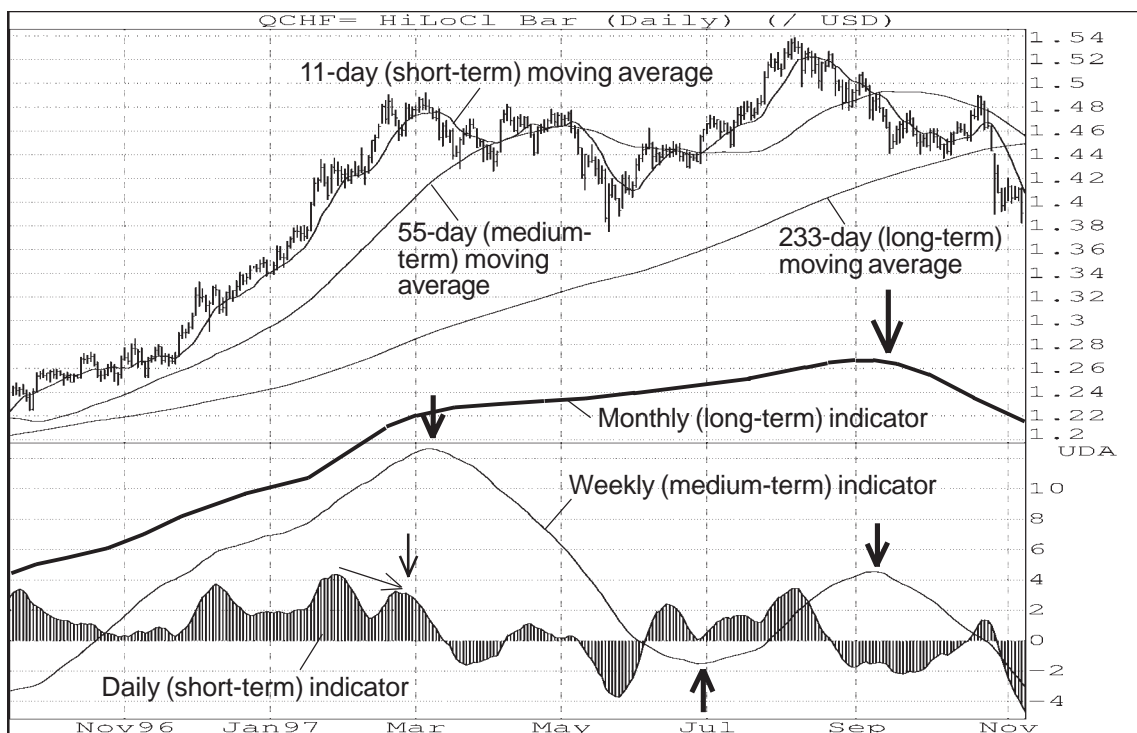
We then combine the momentum indicators with the moving averages to identify the trends in force and to assess the most likely future path of these trends.

The highest investment return is achieved when investors start buying at the momentum bottom (1/2 position) and buy the other 1/2 position when the price confirms the mo-


```
QCHF= HiLoCl Bar (Daily) (/ USD)
```

Buy signal on momentum indicator was NOT confirmed by price action (no 2-day close above the average)

Daily chart

Daily (short-term) indicator

Positive divergence

mentum indicator´s uptrend and rises above the moving average. Likewise, investors should sell 1/2 position if the momentum indicator tops out and sell the rest if the price falls below the moving average. Thus, a COMBINATION OF THE SIGNALS GIVEN BY THE MOMENTUM, MOVING AVERAGES and SUPPORT and RESISTANCE should be applied.

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Technical Analysis - Explained


```
QCHF= HiLoCl Bar (Daily) (/ USD)
```

11-day (short-term) moving average

55-day (medium-term) moving average

233-day (long-term) moving average

Monthly (long-term) indicator

Weekly (medium-term) indicator

Daily (short-term) indicator
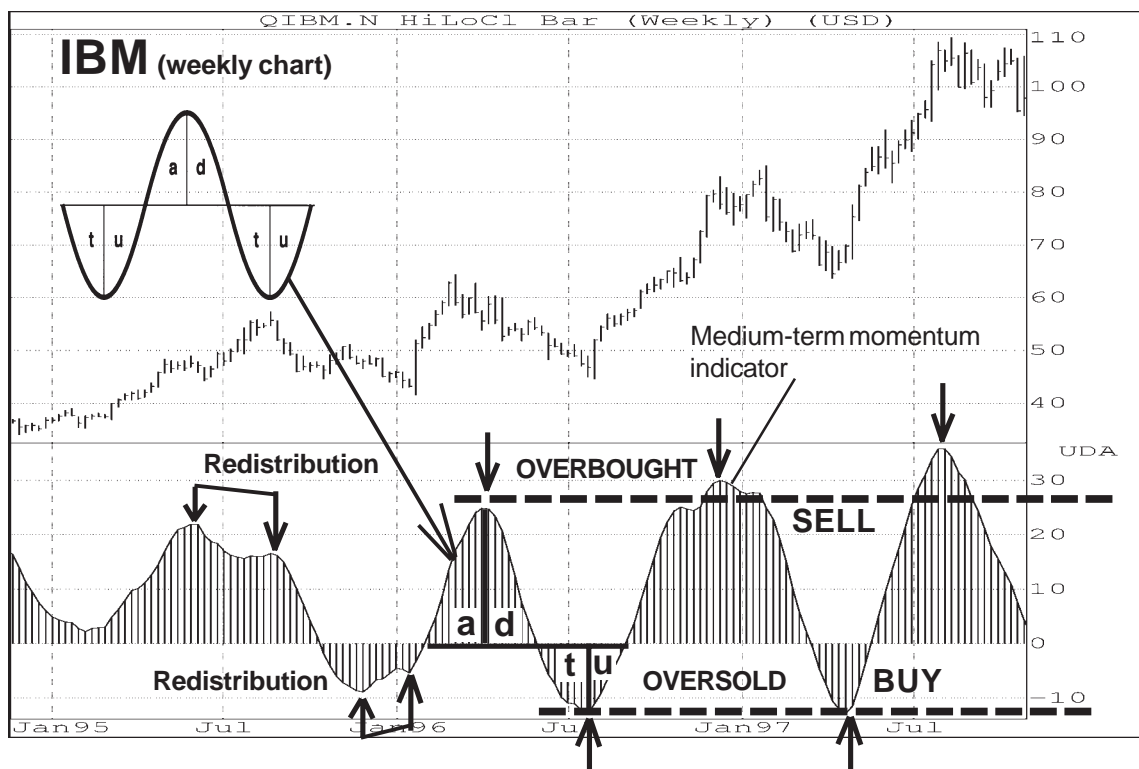
Nov96   Jan97   Mar   May   Jul   Sep   Nov

Trend and momentum combination

On page 14 we showed you the three MOVING AVERAGES (mavgs.) on the monthly, weekly and daily charts. On page 15 we pictured all three averages on one single chart which was the daily chart. We do the same analysis with the MOMENTUM INDICATORS. On the previous page we pictured the long, medium and short-term momentum indicators on the monthly, weekly and daily charts. On this page we show all three momentum indicators on one single chart (which is again the daily chart) together with the moving averages.

On the chart above for US dollar/Swiss franc you see that the long-term trend was rising until October 1997. The dollar was trading above the rising 233-day mavg. and the long-term momentum indicator was rising until it topped in September. The momentum indicator´s top was soon confirmed by the dollar´s fall below the 233-day mavg. The long-term top was also indicated by the negative divergence in the medium-term momentum indicator which registered a lower high in September compared to its high in March, thus not confirming the new high in the dollar at 1.54 in August.

The medium-term trend was bullish from September 1996 until March 1997 when the weekly indicator topped and the dollar fell below the slowing 55-day mavg. The medium-term top in March was also indicated by the negative divergence on the daily indicator which did not confirm the new high in the dollar in February 1997 at 1.49. The daily indicator registered a top which was lower than the top in January.

THE COMBINATION OF THESE SIX INDICATORS reveals the most likely future path of the underlying market. The best of all worlds is when price is rising above the short-term mavg. which is rising above the medium-term mavg. which is rising above the 233-day moving average AND at the same time, the daily, weekly and monthly momentum indicators are rising. The 11-day mavg. is watched in combination with the daily momentum indicator, the 55-day mavg. with the weekly indicator and the 233-day mavg. with the monthly indicator.

Technical Analysis - Explained

QIBM.N HiLoCl Bar (Weekly) (USD)

IBM (weekly chart)

Medium-term momentum indicator

Redistribution

OVERBOUGHT

SELL

Redistribution

OVERSOLD

BUY

Jan95   Jul   Jan96   Ju   Jan97   Jul

Reversal & redistribution

IBM is shown above together with the medium-term momentum indicator on the weekly chart. Signals are given at **trend reversals** at an extreme level. The stock is said to be OVERBOUGHT when the momentum oscillator reaches an extreme upper level above the zero line and OVERSOLD when it reaches an extreme lower level below the zero line. The oscillator acts like a rubber band: the farther it stretches the more energy prices need to sustain the trend, i.e. a trend reversal should be expected.
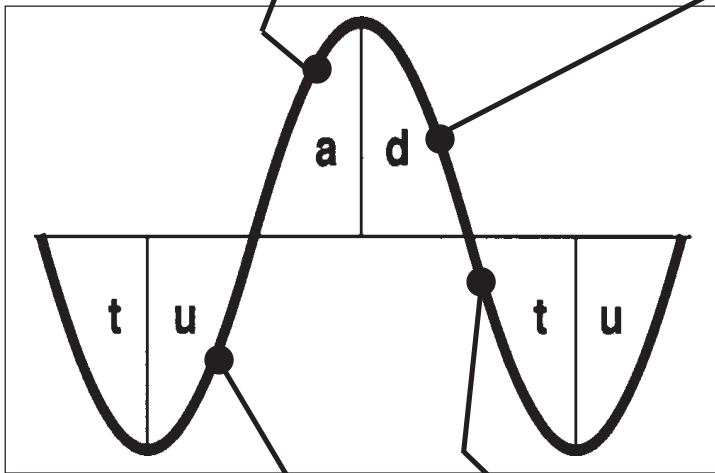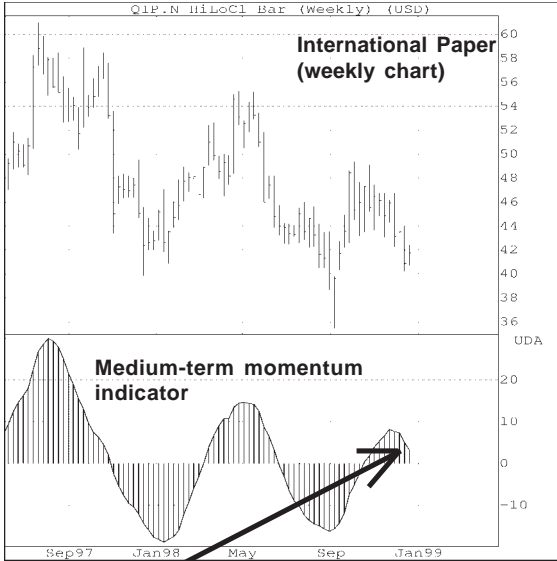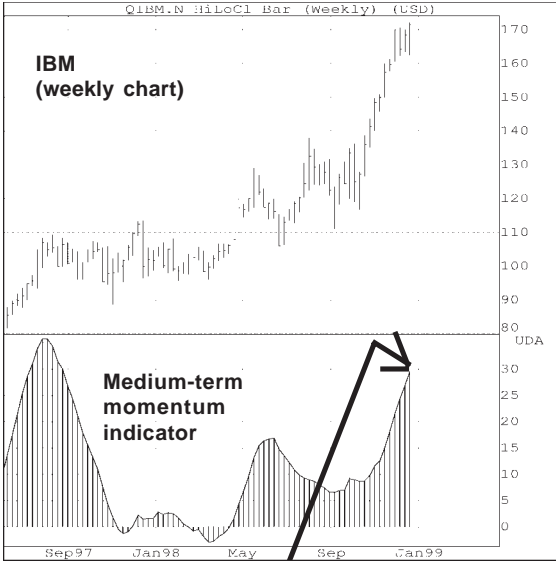
Sometimes signals leave room for interpretation (technical analyis is an art not a science). The indicator does not always cross the zero line before giving a new buy- or sell signal. These signals are called **redistribution** examples (see scheme on the right and chart above) or **divergences**.

Redistribution example

Initial sell signal

True curve

Secondary sell signal

Zero line

a   d   a   d

Very high-risk speculative buy signal

t

Momentum indicator

Sometimes, the oscillator turns **upwards** again from a high level **above the zero line** instead of bottoming below the zero line. This is seen as a high-risk buying opportunity. Most of the time the ensuing price rallies are short-lived and are, more often than not, fully retraced. The same pattern can occur in the opposite direction when the indicator turns **downward** again from a low level **below the zero line** (still oversold)
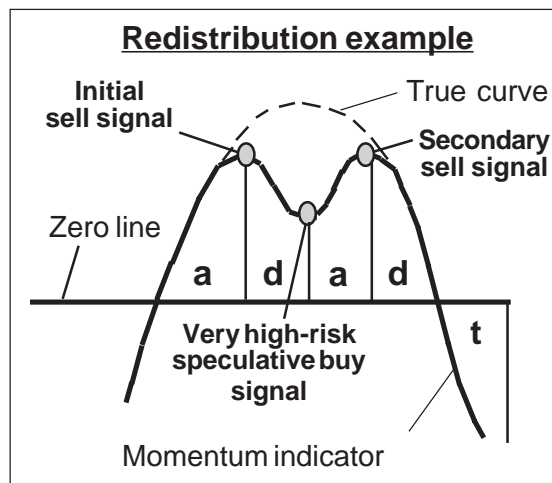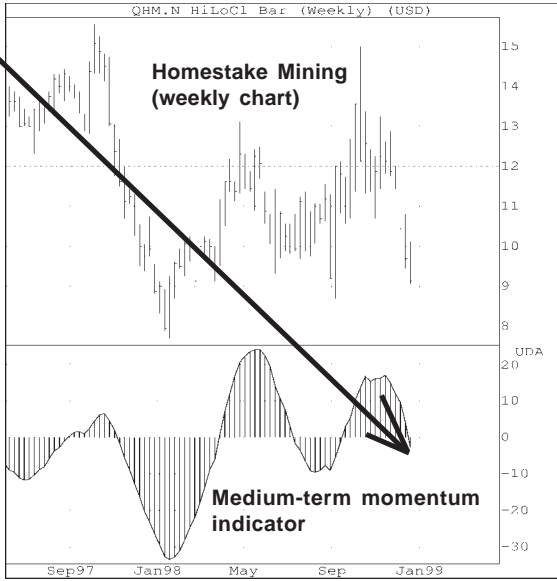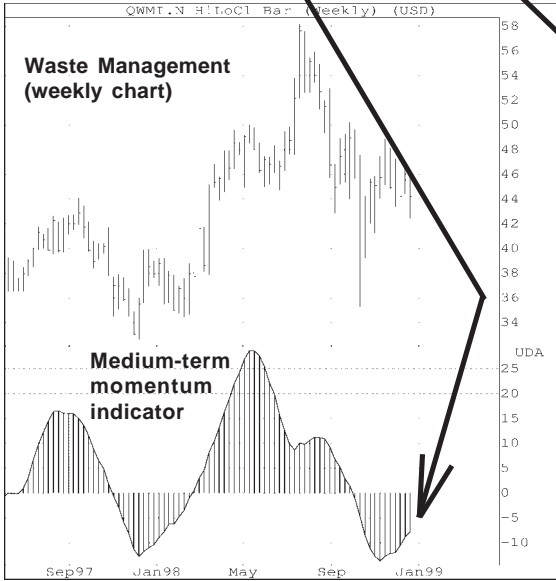
instead of topping above the zero line (overbought level). This is seen as a high-risk selling opportunity. Most of the time the ensuing declines are short-lived and are, more often than not, fully retraced.

The pause and delay in the aberrated trend is often psychologically quite unnerving for the investor. Therefore, patience becomes a tactical requirement, allowing the major underlying trend forces to rebase at the adjusted price level.

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Technical Analysis - Explained

QIBM.N HiLoCl Bar (Weekly) (USD)

**IBM
(weekly chart)**

170
160
150
140
130
120
110
100
90
80

**Medium-term
momentum
indicator**

UDA
30
25
20
15
10
5
0

Sep97   Jan98   May   Sep   Jan99

QIP.N HiLoCl Bar (Weekly) (USD)

**International Paper
(weekly chart)**

60
58
56
54
52
50
48
46
44
42
40
38
36

**Medium-term momentum
indicator**

UDA
20
10
-10

Sep97   Jan98   May   Sep   Jan99

a   d

t   u   t   u

Equity-analysis

Each day we calculate the po-
sition of 1000 stocks on the
short-, medium- and long-term
momentum model. 4 stocks
are shown on this page, each
displaying the medium-term in-
dicator in one of the 4 possible
positions. Investors should
look to buy stocks with a ris-
ing indicator while selling the
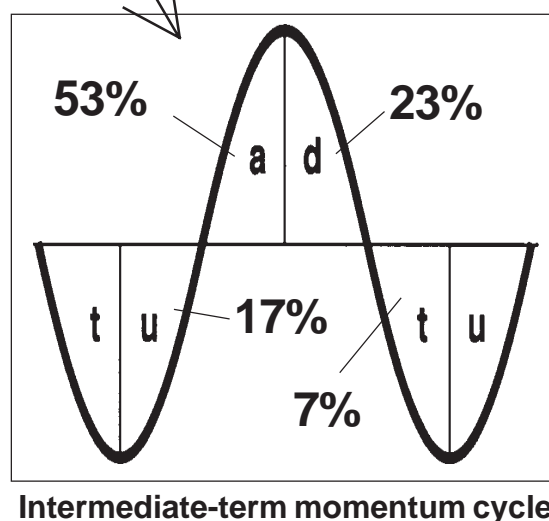stocks with a falling indicator.

QWMT.N HiLoCl Bar (Weekly) (USD)

**Waste Management
(weekly chart)**

58
56
54
52
50
48
46
44
42
40
38
36
34

**Medium-term
momentum
indicator**

UDA
25
20
15
10
5
0
-5
-10

Sep97   Jan98   May   Sep   Jan99

QHM.N HiLoCl Bar (Weekly) (USD)

**Homestake Mining
(weekly chart)**

15
14
13
12
11
10
9
8

**Medium-term momentum
indicator**

UDA
20
10
0
-10
-20
-30

Sep97   Jan98   May   Sep   Jan99

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Technical Analysis - Explained

% CYCLE PHASE DISTRIBUTION			
Number of Files = 100%			30

	Long Cycle	Intermediate Cycle	Short Cycle
Up	0	17	50
Advancing	30	53	13
Declining	30	23	7
Terminating	40	7	30

Cycle phase distribution

On the previous page we pictured 4 stocks and their weekly momentum indicators. If we take 30 stocks instead of only 4 and calculate the medium-term indicator for each of the 30 stocks, we can calculate the number of stocks positioned in each cycle quadrant. The example above shows the 30 stocks in the Dow Jones Industrial Index. The analysis was done on 20 December 1998. For each stock we calculated the position of the long-term, medium-term and short-term momentum indicators. On the right we highlight the distribution of the medium-term indicators. The distribution shows

Intermediate-term momentum cycle

  5 stocks (17%) with a momentum indicator rising below the Zero line **(up)**
16 stocks (53%) with a momentum indicator rising above the Zero line **(advancing)**
  7 stocks (23%) with a momentum indicator falling above the Zero line **(down)**
  2 stocks (7%) with a momentum indicator falling below the Zero line **(terminating)**
Thus, the entire portfolio of 30 stocks equals 100%. We use percentages so that we can compare different portfolios and markets with different stocks.

The same percentage distribution is shown above for the long-term indicators (based on the monthly charts) and the short-term indicators (based on the daily charts). From this data we can see that as of 20 December 1998 the 30 stocks were quite advanced in their intermediate-term uptrend (a+d=76%; see page 17 for cycle phases). Moreover, the long-term analysis shows that most stocks were in the bearish phase (d+t=70%). Only the short-term pointed to strength (u+a=63%) into 1Q 1999.

We do this type of momentum analysis for 1000 stocks, 35 indices, 30 commodities, 15 bond-futures and currencies each day for the long-term, medium-term and short-term horizon (see page 10). We search for those markets and stocks that are positioned in bull phases on the daily, weekly and monthly charts, and those that display falling indicators. The indicators provide a clear outlook and objectivness, allowing investors to buy and sell against the backdrop of subjective emotional stress (see pages 5 & 6).

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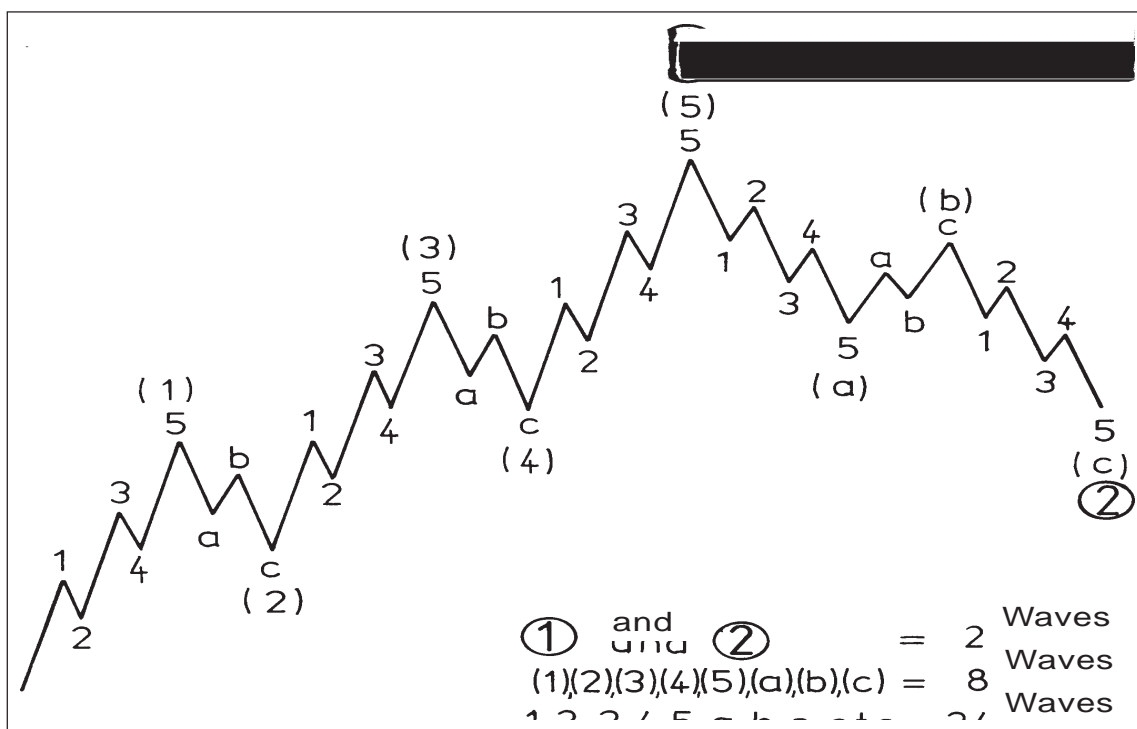
The Elliott Wave Principle

The Wave Principle was Elliott's discovery of how social or crowd behaviour trends and reverses in recognizable patterns. It is a detailed description of how financial markets behave. The description reveals that the psyche of the crowd constantly moves from pessimism to optimism and back in a natural sequence, creating specific patterns in price movement. This concept of recursive patterns across finer and finer scales in the financial markets (their fractal nature), was proposed by Ralph Nelson Elliott in the 1930s, which antedates today's formal study of non-linear dynamics and chaos.

The main point emerging from the Elliott Wave concept is that markets have **form (pattern)**. It is here that the investor finds determinism in a seemingly random process. Elliott discovered what the main initiator of the newly emerged chaos theory, Benoit Mandelbrot, confirmed 50 years later in collaboration with Henry Houthakker, an economics professor at Harvard: that patterns made by taking very short-term "snapshots" of stock prices, for example once every hour, are similar to patterns formed by snapshots taken once a week, or once a month, or even once a year.
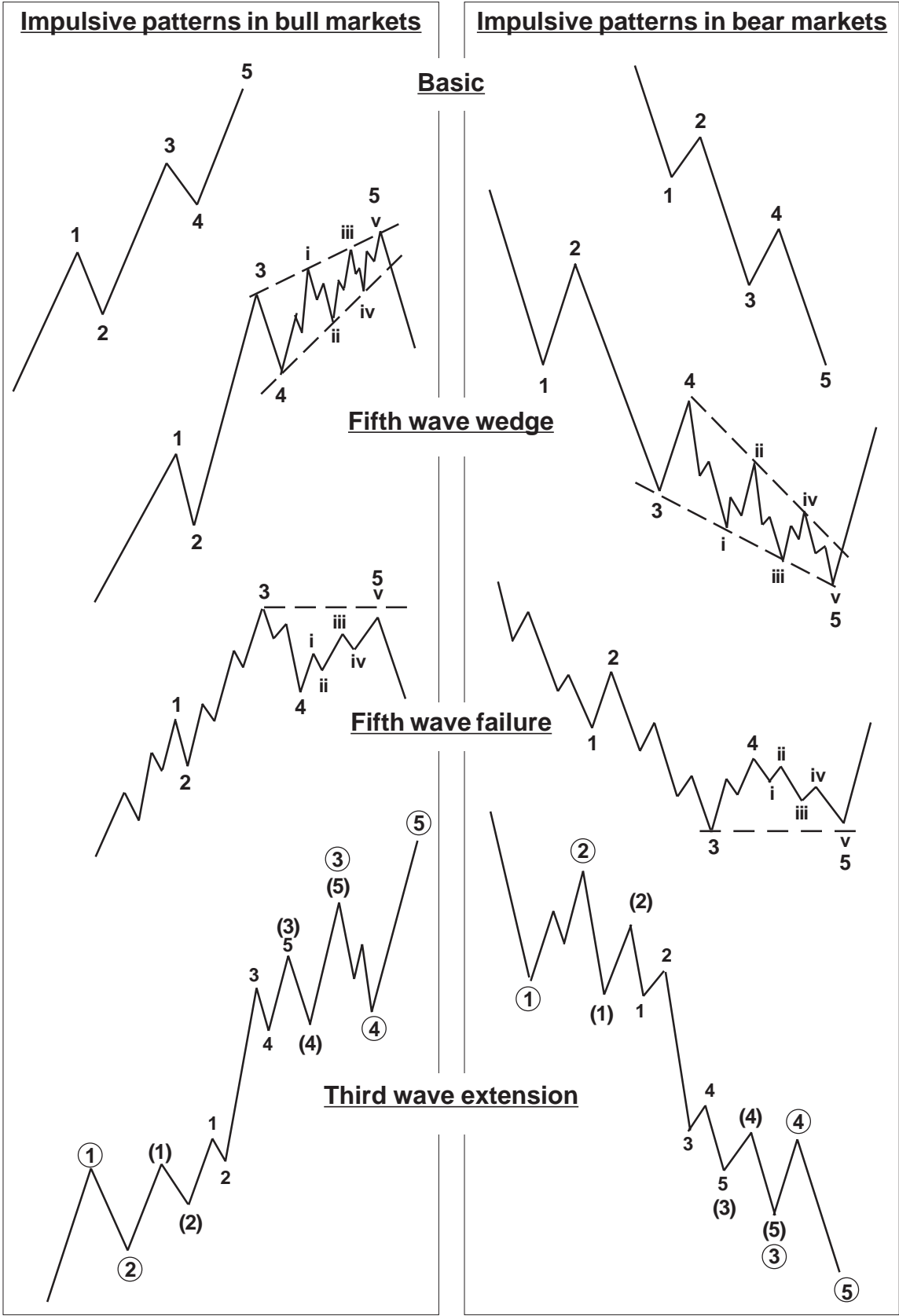
Elliott isolated thirteen patterns or "waves". He cataloged the price patterns and explained how these patterns link together, and where they are likely to occur in the overall path of market development.

The basic pattern shows that markets move forward in a series of 5 waves of psychological development (from pessimism to optimism). When these 5 forward waves are complete a reaction sets in, taking place in 3 waves (from optimism to pessimism), sets in.

Numbers are used to designate "5-wave" patterns, and letters to designate "3-wave" patterns. These 8 waves then complete a cycle from which a new series of 5 waves commences, to be followed by another set of 5 waves. And finally, after two sets of 5 waves (1) and (3) and two sets of three wave patterns (2) and (4), a final set of 5 waves materializes and completes the whole pattern.
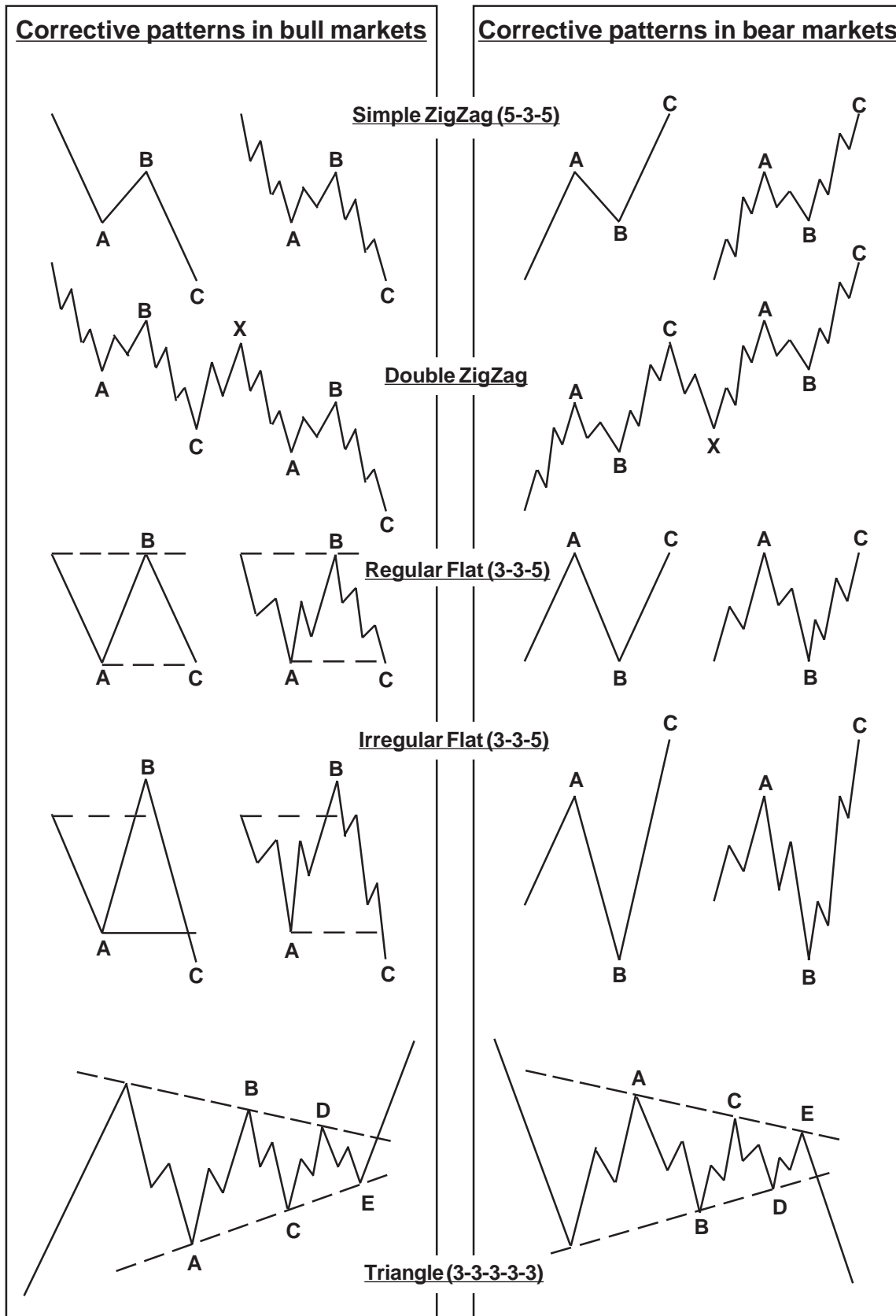
At this point, after wave (5) is complete, there is now a set of 3 waves (a), (b) and (c) of greater magnitude than the two previous corrections. This set would correct the whole of the 5 upward waves, which themselves had each broken into 5 and 3 smaller waves along the way.
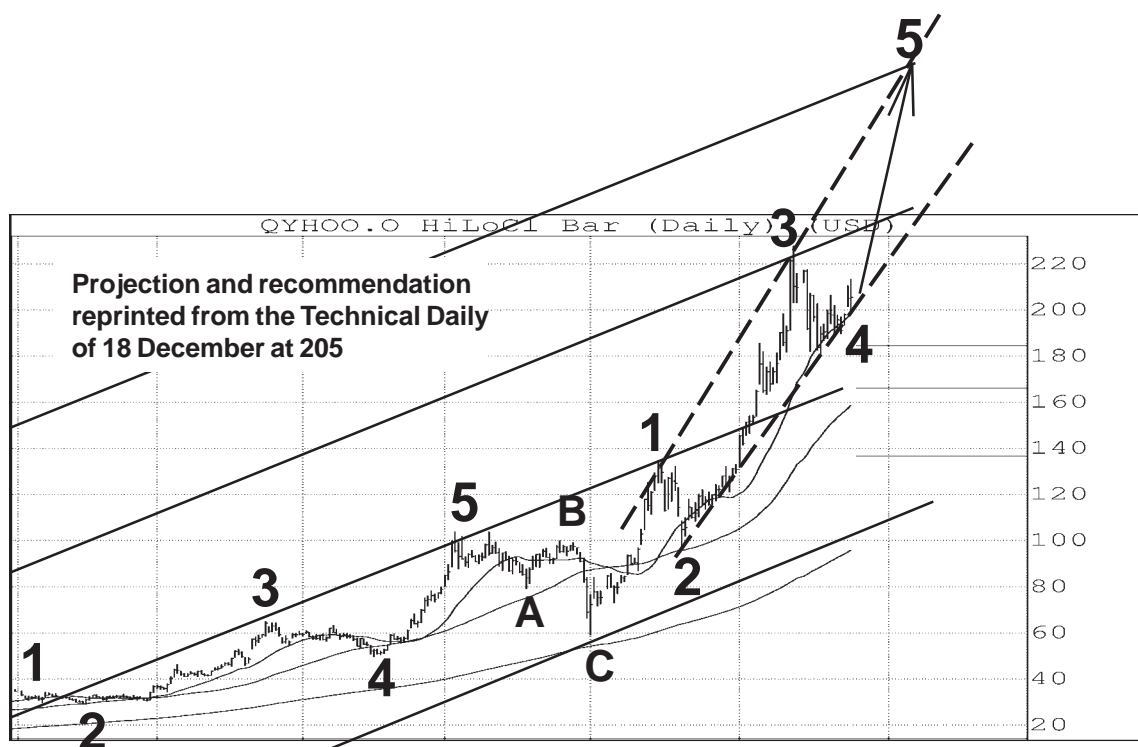
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Technical Analysis - Explained

Impulsive patterns in bull markets

Impulsive patterns in bear markets

Basic

Fifth wave wedge

Fifth wave failure

Third wave extension

Catalog of impulsive waves

Technical Analysis - Explained

Catalog of corrective patterns

Within the figure, the following labels appear:

Corrective patterns in bull markets

Corrective patterns in bear markets

Simple ZigZag (5-3-5)

Double ZigZag

Regular Flat (3-3-5)

Irregular Flat (3-3-5)

Triangle (3-3-3-3-3)

Technical Analysis - Explained

QYHOO.O HiLoCl Bar (Daily) (USD)

Projection and recommendation reprinted from the Technical Daily of 18 December at 205
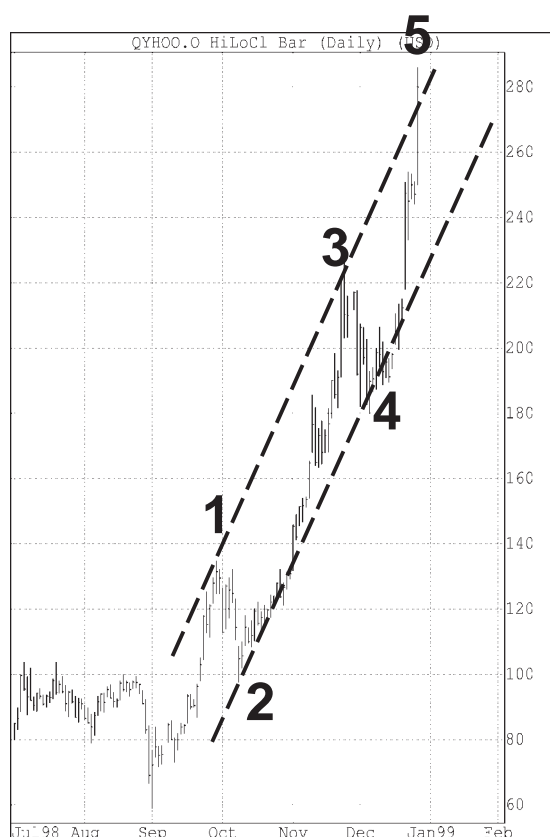
Impulsive wave patterns

If you have followed the argument thus far, the implications begin to appear. Given a series of smaller 5 and 3 waves, the investor should be able to predict the continuation of the 5-3 pattern until a wave of larger degree is completed. It is the knowledge of these patterns that allows the investor to know that a trend change will occur *before* it has occured.

An example of a five wave pattern is shown above for Yahoo. The chart is taken from our recommendation in the Technical Daily of 18 December at 205. We said that the long-term uptrend was not complete yet, and that at least one more upleg should be expected.

The chart on the right is updated to show the five wave pattern that was completed from the low in August at 60. Wave correlation suggested that the minimum price target was around 260/280. The price reached 280 and was immediately followed by a sharp correction. Ultimately, the price completed another five-wave pattern at 440.

QYHOO.O HiLoCl Bar (Daily) (USD)

Technical Analysis - Explained
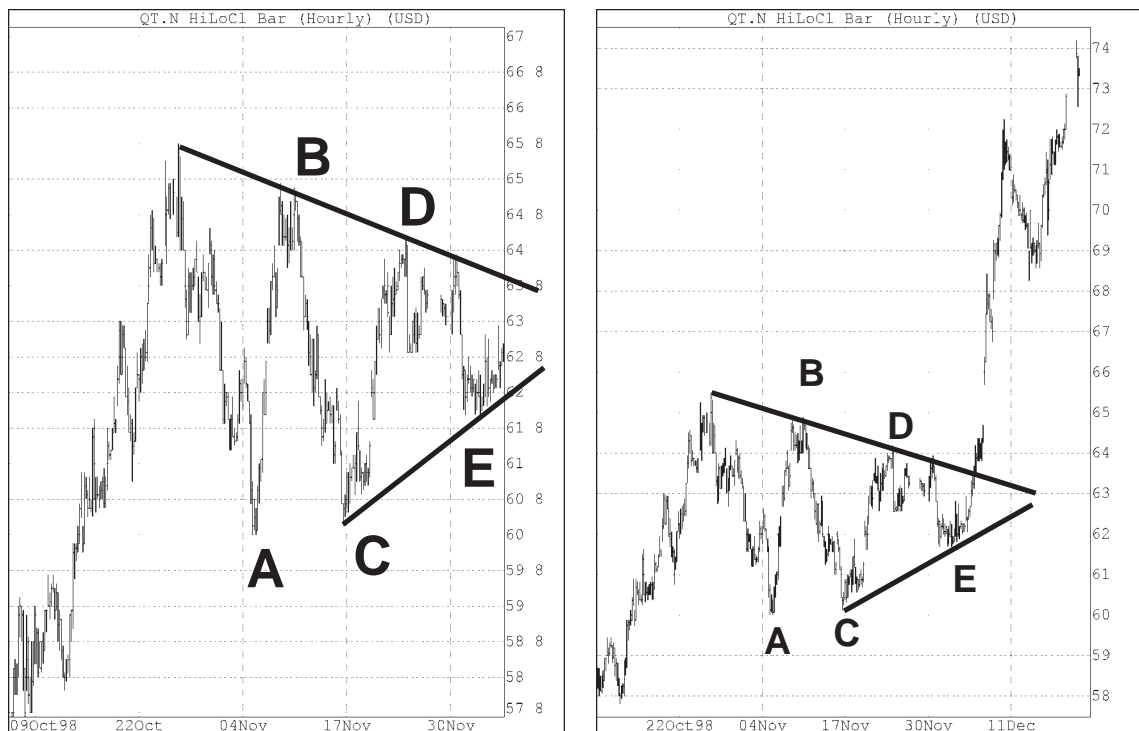
Corrective wave patterns

The scheme on page 25 lists the corrective patterns which can appear in financial markets. Corrective patterns can become very complex and difficult to interpret. However, once a correction is completed, its form provides important information on the most likely path of the next impulsive wave.

The chart above displays one of the most widely recognized patterns: the horizontal triangle. It is shown on the hourly chart of ATT between 27 October and late November between 65 and 60. Soon after wave E was completed the stock broke out on the upside and reinstated its larger uptrend.

The example above is one of a few thousand that we have seen developing. Some triangles are ascending, some are descending and some are expanding. Together with the Zigzags and Flats they make up the list of corrective patterns.

What sets the wave principle apart and ahead of other technical approaches is primarily this characteristic of **design** and **form**. Each market pattern has a name and specific form determined by a small number of rules and guidelines. Yet, a specific pattern is never identical to another pattern of the same type. The patterns are variable enough in some aspects to allow for limited diversity within patterns of the same type. **It is this "self-similarity" which makes up the difference between deterministic chaos and random-walk.**
It takes a few rules and guidelines to correctly count the waves. For more details we refer to the list of books on page 32.

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Technical Analysis - Explained
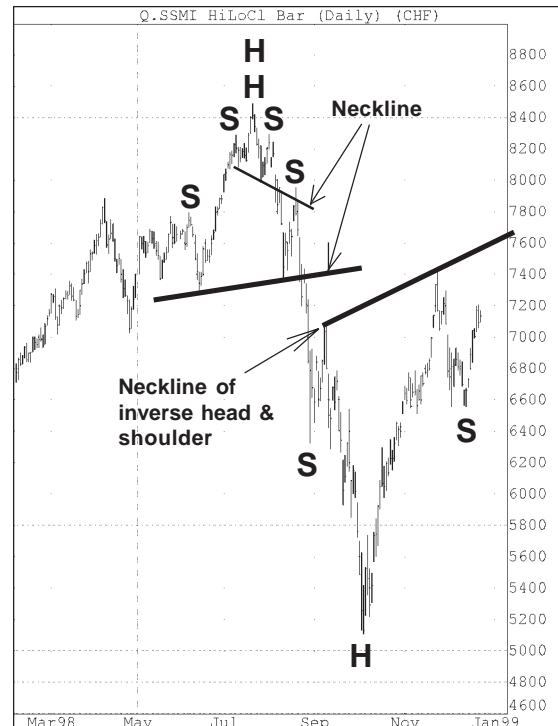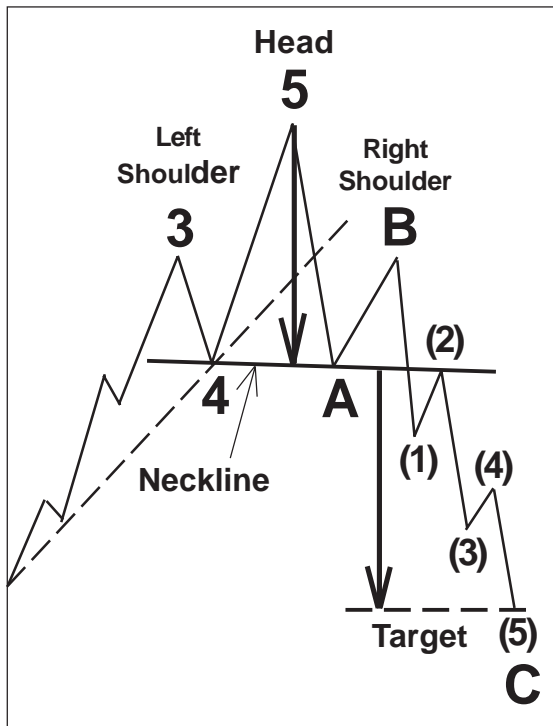
Head and shoulder reversal pattern

The H&S is the best known of all chart reversal patterns and is formed when an uptrend loses momentum, levels off and then establishes a downtrend. At "3" on the scheme above left the uptrend is powerful, with no evidence of a top formation. Volume tends to pick up as higher highs are made. The dip to "4" on lighter volume is, at this stage, considered a correction within the broader uptrend. The rally to "5" on diminishing volume alerts the technician that a top may be close at hand. The fall in prices to "A" is breaking the uptrend, falling towards the previous reaction low at "4". The market then rallies to "B" which is generally 50% to 61.80% of the decline from "5" to "A". To re-establish the primary uptrend, each swing high must exceed the high preceding it. The failure of "B" to regain the high at "5" fulfills half the requirement for a trend reversal (i.e. descending peaks).

Additionally the uptrend line by this stage has been broken on decline "5" to "A", and now all that remains is the break of the "neckline" drawn under the two reaction lows "4" and "A". The neckline can be upward sloping or downward sloping or may be horizontal. A closing break below the neckline on increased volume activates this pattern.

The **measured target** of the break is the height of the "head" above the neckline (wave 5 to wave A), projected down from the neckline break.

The INVERSE head and shoulder formation works exactly the same only in the opposite direction.

This basic head and shoulder has one negative aspect: investors have to wait for a break of the neckline to sell. However, such a break may occur rather late if the head occurs at a highly overbought level. Applying Elliott Wave analysis provides a much earlier sell signal which is when the five-wave uptrend tops and the correction starts to display impulsive patterns on the downside. Moreover, Fibonacci correlations allow for a more precise method to analyze the wave correlation, retracement and wave length as shown on the next page.

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Technical Analysis - Explained

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584...........

1+1=2
2+1=3
3+2=5
5+3=8
8+5=13
13+8=21
21+13=34
34+21=55
55+34=89
89+55=144
144+89=233
233+144=377
377+233=610
etc...........

1.618 = 3/2, 5/3, 8/5, 13/8, ...

0.618 = 2/3, 3/5, 5/8, 8/13, ...

A   B   C

AB/BC=BC/AC=0.618

Any length can be divided so the ratio between the smaller part and the larger part is equivalent to the ratio between the larger part and the whole. The ratio is always 0.618.

Fascinating Fibonacci

It may surprise some of you to learn that the universe, the constellations, the galaxy, flowers, oceans, plant life, man, natural science, music, architecture AND THE FINANCIAL MARKETS have one thing in common: the FIBONACCI SEQUENCE. Leonardo Fibonacci was a thirteenth century mathematician who developed a number sequence of the form: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610 .... where each number is the sum of the previous two numbers.

This sequence of numbers has some very important properties.

For example: The ratio of any number to the next number in the sequence is 0.618 to 1 and to the next lower number is 1.618.

Between alternate numbers in the sequence the ratio is 2.618 or its inverse 0.382.

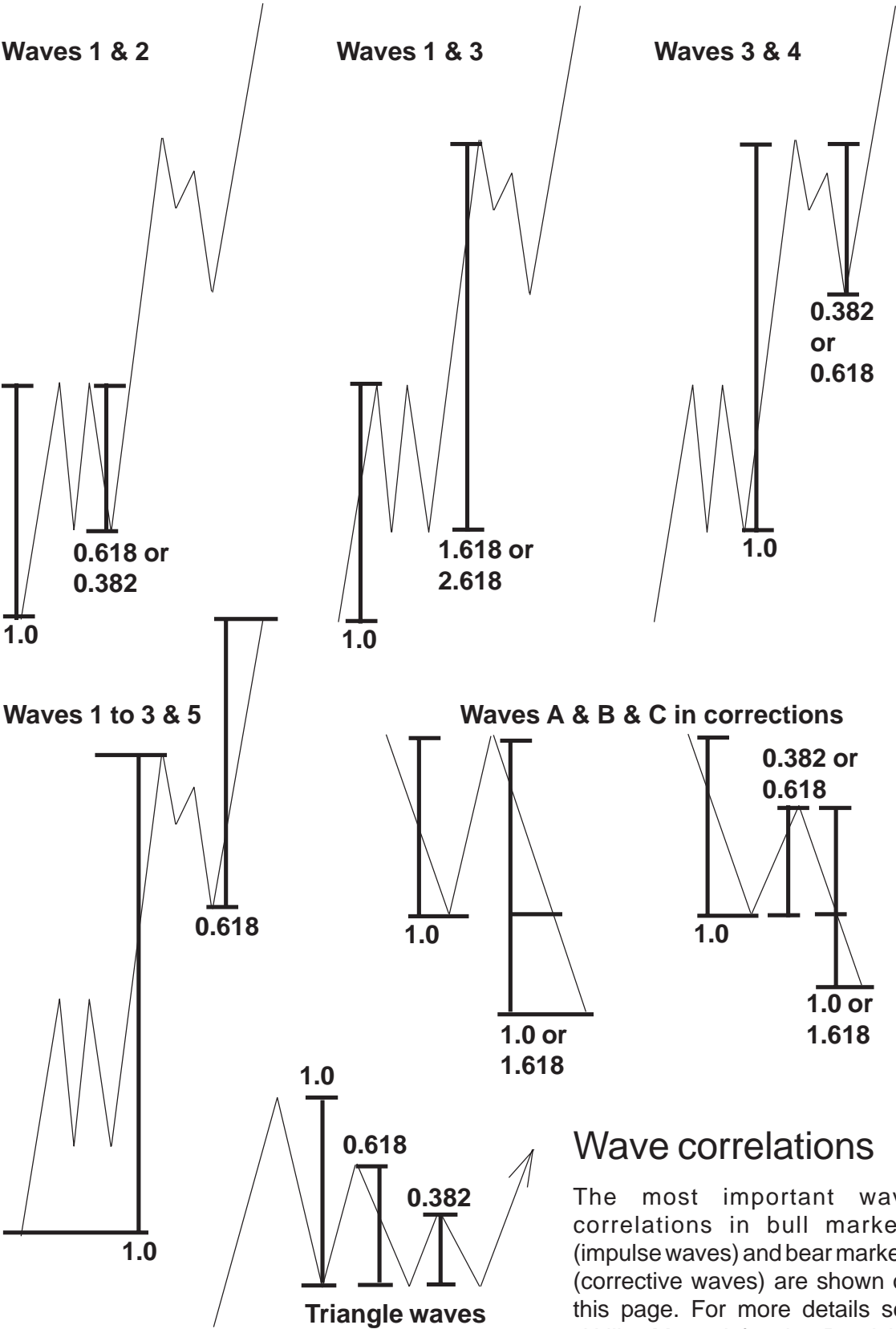These numbers have some special relationship of their own such as

1) 2.618 - 1.618 = 1   4) 0.618 x 0.618 = 0.382

2) 1 - 0.618 = 0.382   5) 1.618 x 1.618 = 2.618

3) 2.618 x 0.382 = 1

Additional phenomena relating to the Fibonacci sequence includes:

1) No two consecutive numbers in the sequence have any common factors.

2) The sum of any ten numbers in the sequence is divisible by 11.

3) The sum of all Fibonacci numbers in the sequence +1 equals the Fibonacci number two steps ahead.

4) The square of a Fibonacci number minus the square of the second number below it in the sequence is always a Fibonacci number.

There are numerous relationships within this series, but the most important is 1.618 or 0.618. It is known as the Golden Ratio or Golden Mean and governs nature´s growth patterns.

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Technical Analysis - Explained

Waves 1 & 2

Waves 1 & 3

Waves 3 & 4

0.618 or
0.382

1.0

1.618 or
2.618

1.0

0.382
or
0.618

1.0

Waves 1 to 3 & 5

Waves A & B & C in corrections

0.618

1.0

1.0 or
1.618

0.382 or
0.618

1.0

1.0 or
1.618

1.0

1.0

0.618

0.382

Triangle waves

Wave correlations

The most important wave correlations in bull markets (impulse waves) and bear markets (corrective waves) are shown on this page. For more details see "Utility Manual for the Precision Ratio Compass", Robert Prechter, New Classics Library, 1986.

Technical Analysis - Explained
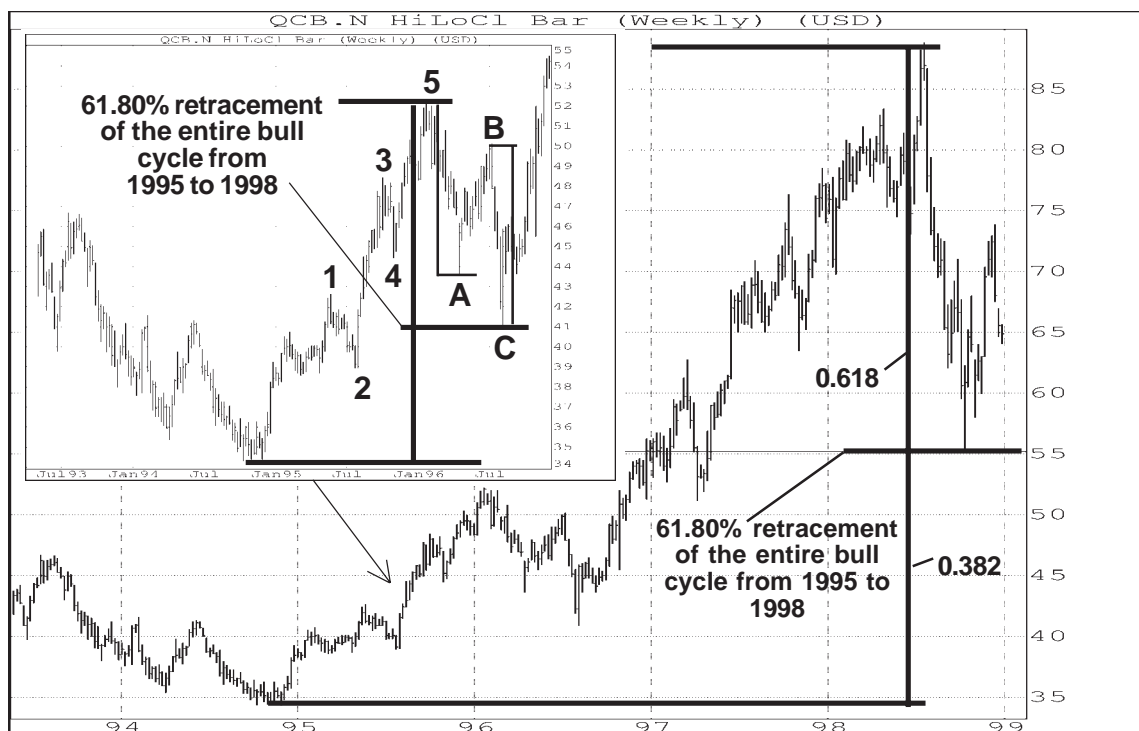
Fibonacci correlations - more than coincidence

A man´s body, if you divide the body at the navel - from the navel to the top of the head is about a 0.618 ratio of the lower part of the body (from the navel to the feet).
The ratio 0.618 to 1 is the mathematical basis for the Parthonon, sunflowers, snail shells, spiral galaxies of outer space or the human DNA spiral. Spirals on shells when examined more closely are shown to have arcs whose lengths are ratios of their diameters that equate to 1.618, and the larger radius is related to the smaller radius by 1.618. This is known as the golden spiral. The Greeks based much of their art and architecture on this proportion.

Financial markets have the same mathematical basis as natural laws. This is because the markets are not only numbers or economic factors but most important reflect the human nature: emotions in motion. Elliott was probably the first to associate Fibonacci with technical analysis and when he wrote "Nature´s Law" referred specifically to the Fibonacci sequence as the mathematical basis for the wave principle: a bull market sub-divides into five legs, and a bear market into 3 legs which makes a total of 8. If the subwaves are counted we arrive at 34 waves (see page 23).
The charts above (Chubb Corp.) show two examples of a 61.80% retracement on a long-term basis. The decline from July 1998 had retraced exactly 61.80% of the previous bull trend from 1995 to 1998 at 55. Moreover, within the long-term uptrend wave 1 traced out five subwaves from 4Q 1994 to 1Q 1996. The correction traced out a perfect a-b-c pattern. Wave c was equal in length to wave a and the entire a-b-c correction retraced 61.80% of the previous five-wave structure. We could show you hundreds of such examples.

The wave pattern and the Fibonacci relations are the language of the financial markets. It takes time to learn it, but in the end you will understand what the markets are indicating.

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Technical Analysis - Explained

DIPLOMA
IN
BASIC
TECHNICAL ANALYSIS

Congratulation

You made it through the basic concepts of technical analysis. If you want to go into more detail we recommend the following bibliography:

Gustave Le Bon, "Psychologie der Massen", Kröner Verlag, Stuttgart, 1960.
Elias Canetti, "Masse und Macht", Claassen Verlag, Düsseldorf, 1960.
Heinz-Otto Peitgen and Dieter Saupe, "The Science of Fractal Images", Springer Verlag, New York, 1988.
Benoit Mandelbrot, "The Fractal Geometry of Nature", W.H. Freeman, Foundation for the Study of Cycles, Irvine, California, 1987.
James Gleik, "Chaos: making a new science", Viking, Foundation for the Study of Cycles, Irvine, California, 1987.
Robert R.Prechter, "Elliott Wave Principle", 1984, "Major Works of R.N.Elliott", 1984, New Classics Library, Gainesville, Georgia, 1985.
Ian S.Notley, "The Stock Cycles and Investment Timing", Yelton Fiscal. Ridgefield, 1977.
John J.Murphy, "Technical Analysis of the Futures Markets", New York Institute of Finance, New York, 1986.

The strong points of technical analysis are:
- is governed by a system of rules and guidelines
- provides objectiveness in the decision-making process
- is fast to apply (once skills are learned)
- is applicable across all time frames
- is applicable to all markets
- generally pre-empts fundamental data
- has been proven in the market for over 200 years
- **is fun and can earn you money.**

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