Technically Speaking

OCTOBER 2014

Market Technicians Association

LETTER FROM THE EDITOR

We have a variety of articles for you to consider this month. We start with a look back. Many of us forget that trading software is relatively new and in the first article, one of the pioneers in the development of trading software, Louis Mendelsohn, provides insights into the evolution of software and technical analysis. We are also reprinting some of Lou's work from the 1990's which detail problems the financial industry still faces today.

We then look at volatility using articles that rely more on the common VIX indicator including the thoughts of three Federal Reserve economists. Other articles provide insights into the state of the markets and work being done by MTA members and chapters around the world.

MTA member, Stella Osoba, CMT, published "Women on Wall Street" on Traders Planet. The article provides valuable career advice for both individuals breaking into the field and those in established positions. The article highlights ten valuable career tips for those seeking a job or for those looking to advance within their current position. You can read the whole article at http://go.mta.org/12184

After reading that article, please let us know if you think it would be beneficial to include content similar to that in *Technically Speaking*. You can always reach us at editor@mta.org.

Sincerely,

Michael Carr

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# THE EVOLUTION OF TECHNICAL ANALYSIS: THE CATALYZING FORCE
BY BRANDON JONES

Evolution is about change… adaption… survival. For a thing to evolve, though, it needs a catalyst - an environmental shift of a substantial magnitude or a subtle mutation - that forces change to occur.

In the late 1970s, the magnitude of the newly introduced personal computer (PC) caused an environmental shift that forced change upon the world. Adapt or perish was the new reality for everyone. In the financial sector, this reality was equally true, except that a not-so-subtle mutation in technical analysis made adapting even more imperative. If those who traded markets did not adapt, they perished.

Recently, a number of trading publications have featured articles highlighting the evolution of technical analysis since the advent of personal computers nearly forty years ago. As history tells us, technical analysis evolved dramatically with the introduction of PC-based trading software and then again later as the global economy emerged and the world's financial markets became increasingly interconnected.

One commodities trader turned trading-software developer has been on the leading edge of the evolution of technical analysis– Louis Mendelsohn. Working full time in the mid-to-late 1970s as a hospital administrator, while trading commodity futures contracts on the side, Mendelsohn fostered a new age in both technical analysis and trading software. His innovative work with PC-based trading software catalyzed the evolution of technical analysis. It transformed from hand-drawn charts derived from computing technical indicators on hand-held calculators, and software that merely automated these functions, to technical analysis calculated on powerful personal computers.
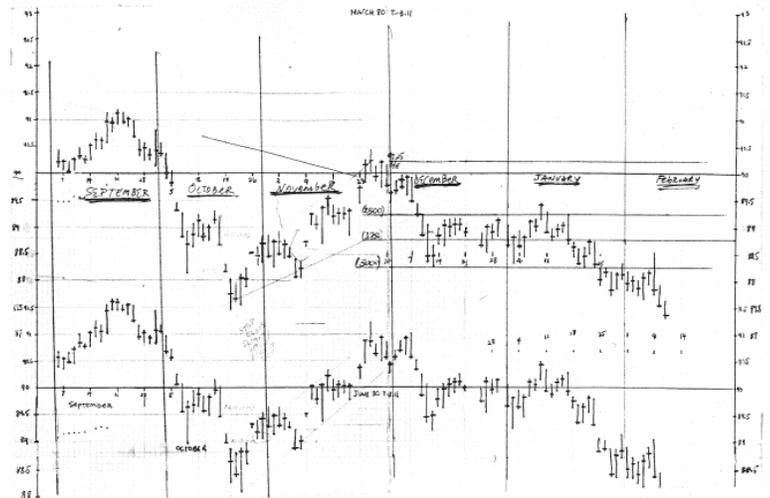
Prior to the use of trading software, charts were maintained by hand as shown in the nearby example. This is a hand-drawn chart from Mendelsohn's archives, circa 1979 tracking US Treasury Bill Futures from the days before computerized trading software.

Mendelsohn had a vision – he was determined to squeeze all the power from personal computers to produce technical analysis previously only available to traders at big trading firms with large research staffs and mainframe computers at their disposal. In 1979, at 31, he started Market Technologies to develop PC-based trading software for his own use and

to license it to other like-minded commodities traders. Mendelsohn understood that the PC coupled with powerful analytic software would become the future for traders.

Mendelsohn unveiled his first new tool for traders in 1983, *ProfitTaker Futures Trading Software.* With that software, he introduced strategy back-testing for personal computers, an innovative and unprecedented approach to analyzing potential trades.

Other futures traders began to follow his approach, which he presented in a series of articles on trading software published in *Futures* magazine in 1983. He also presented his visionary ideas as a speaker and expert on technical analysis in panel discussions at international trading conferences. His expertise expanded and his influence spread. Hand-drawn charts and hand-held calculators for technical analysis would soon join Tyrannosaurus Rex as a relic of the past because of Mendelsohn's vision. PC-based trading software would transform from mere automation of functions to a truly powerful tool. Mendelsohn worked with industry leaders to build a fully functional software package.

His strategy back-testing software, the first such commercially available software to offer this incredibly powerful capability at the PC level, furthered the evolution of technical analysis and energized the growth of what would soon become a multi-million dollar trading-software industry, an industry built in large part on Mendelsohn's pioneering innovations.

Figure 1: A letter to Mendelsohn from Microsoft, written on a typewriter. The Microsoft registered trademark is circled with blue ink. As Lou notes, "That's right – no word processing at Microsoft in 1982. There are also typos in the letter which were fixed with 'correcto-type'"

During the incubation period for PC-based trading software, while still a cottage industry of individual developers, early customers of Market Technologies became trading software developers themselves and created their own software, incorporating strategy back-testing patterned after *ProfitTaker*.

Mendelsohn's genius was about creating a new paradigm for traders in a world that would rapidly evolve, a world the same in that moment, but yet a world on the verge of unprecedented new possibilities. Like most forward thinkers who are doers, Mendelsohn acted in the moment of his time because he saw the possibilities. And, like most visionary entrepreneurs, he didn't just stumble upon back-testing strategies with *ProfitTaker.* He worked through a process that had steps, a process that created other important pieces along the way that would add real value to the trading tool chests of traders around the world.
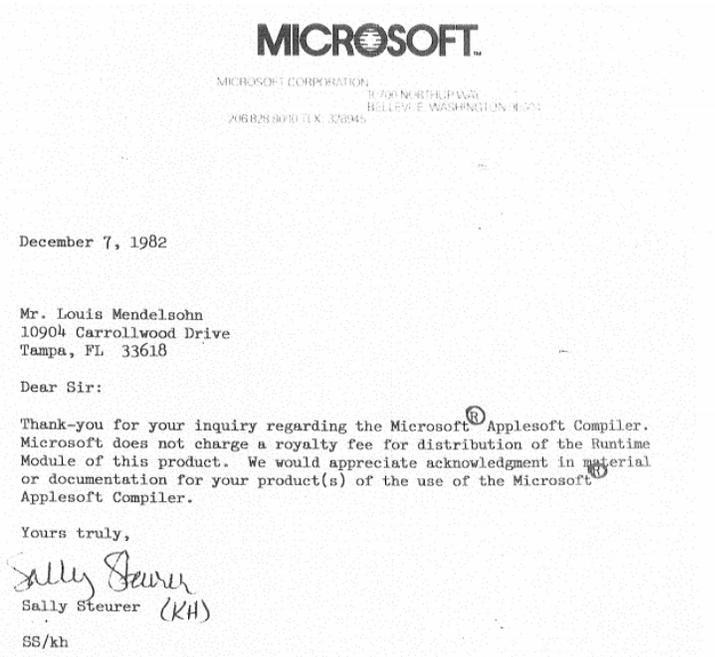
Those pieces include other significant contributions to the world of computerized technical analysis and more stages in the evolution of the trading-software industry. Many of those contributions were incorporated into *ProfitTaker* in 1983, including the capability to perform rollover testing on actual expiring futures contracts, testing for lock-limit conditions that would prohibit a trade from being taken, forecasting closing prices a day in advance so that traders could execute trades just prior to the close rather than having to wait until the next morning's open, quantifying the impact of execution timing on trading system performance, and displaying comprehensive history tester performance results.

Below are reproductions of handwritten notes that were used in the development process. The first two pages show Mendelsohn's hand-written notes on how to program software to test actual futures contracts with rollovers, circa 1980 – 1981.

The next three figures are hand-written notes on the design, layout and content of various reports to include in a history tester, circa 1980 – 1981.

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PROFIT  ANALYST  SUMMARY

ROLLOVER FROM: TBILL G    06/81                              PAGE: 6
ENTR=CLOSE  EXIT=CLOSE    RANGES  S=3  I=4  L=5    UP BAND=8 DN BAND=9
                    TRADING PERFORMANCE RESULTS
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TRADING PERFORMANCE RESULTS (with handwritten annotations):

- 1 /TOTAL NUMBER OF CLOSED OUT TRADES ✓ — 36 — K0-2 ✓ — Number of Buy LONG WINNING TRADES
- 2 ⁵TOTAL NUMBER OF WINNING TRADES ✓ — 12
- 3 ⁷TOTAL NUMBER OF LOSING TRADES ✓ — 26 — K1-3 ✓ — Number of Sell SHRT WINNING TRADES
- 4 ⁷TOTAL NUMBER OF BREAKEVEN TRADES ✓ — 0

- 5 ⁹PERCENT OF WINNING TRADES ✓ — 3.15
- 6 ¹⁰PERCENT OF LOSING TRADES ✓ — .684 — K2-5 ✓ — Number of Buy LONG LOSING TRADES
- 7 ¹¹PERCENT OF BREAKEVEN TRADES ✓ — 0

- 8 ¹²TOTAL REALIZED PROFITS ✓ — 16050 — K3-6 ✓ — number of Sell SHRT LOSING TRADES
- 9 ¹³TOTAL REALIZED LOSSES ✓ — -19825
- 10 ¹⁴CUMMULATIVE PROFIT OR LOSS ✓ ✓ — -3775

- 11 ²⁰MAXIMUM WINNING TRADE ✓ — 342 — K4-(15) Ratio Cummulative profit to [#13] total REALIZED losses (right sign only calculate if Positive #14)
- 12 ²¹MAXIMUM LOSING TRADE ✓ — -1900

- 13 ²²AVERAGE WINNING TRADE ✓ — 1337.5 — K5-16 Commissions- Closed out trades (30 x # closed out trades) 30×#1
- 14 ²³AVERAGE LOSING TRADE ✓ — -762
- 15 ²⁴RATIO AVERAGE WINNING/LOSING TRADE ✓ — 754

- 16 ²⁵AVERAGE PROFIT OR LOSS PER TRADE ✓ — -99.3 — K6-17 SLIPPAGE (# Closed out trades + # rollover days) #50 (#1 + #38) #50

- 17 ²⁶MAXIMUM # CONSECUTIVE LOSING TRADES ✓ — 6
- 18 ²⁷MAXIMUM %% CONSECUTIVE LOSS ✓ — -4725 — K7-18 CUMMULATIVE NET REALIZED profit or loss #14-(#16 + #17)
- 19 ²⁸MAXIMUM DRAWDOWN ✓ — -4725

- 20 ²⁹PROFIT FACTOR ✓ — .809 — 19 Ratio Commissions and SLIPPAGE to cummulative NET REALIZED profit ✓ (only calculate if Positive #18) #16 + #17 / #18
- 21 ¹⁵TOTAL NUMBER OF TRADING DAYS ✓ — 546 — K8-
- 22 ¹⁶TOTAL NUMBER OF HOLIDAYS ✓ — 18
- 23 ¹⁷TOTAL NUMBER OF DAYS IN FILE ✓ — 564

- 24 ¹³TOTAL UNREALIZED PROFITS ON OPEN TRADE ✓ — 0
- 25 ¹⁴TOTAL UNREALIZED LOSSES ON OPEN TRADE ✓ — 0 — K9-30 Sharpe Ratio
- 26 ³⁴CONVERSION FACTOR ✓ — 2
- 27 ⁴⁰POINT VALUE ✓ — 25 — KA - 38 Number of Rollovers in Test days
- 28 ⁴¹DAILY LIMIT ✓ — 60

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              END OF ROLLOVER TEST FOR RANGE
```

- KB - 31 MAXIMUM UNREALIZED INTRA POSITION profit ✓
- KC - 32 maximum unrealized intraposition Loss ✓

SKIP LINE after #1, 4, 7, 15, 19, 21, 24, 25, 28, 30, 34, 37

31   1, 4, 7, 8, 14, 15,   37 = 40×56

3502

PROFIT ANALYST

COMMODITY NAME (LH1282)   RANGE DATES   COPPER

RANGE VALUES   (4-9-18) (.01 .02)   O/C

TRADE #	STOP #	DATE IN	BUY/SELL	PRICE IN	DATE OUT	BUY/SELL	PRICE OUT	Profit	Loss	CUMM NET EQUITY
										INITIAL O
1		—	B	8715		S	8725	+10 x 4 =(40)	—	+40
2			S	8715		B	8725	—	-10 x 4 = 40	(O)
3			S	8715		B	8700	+15 x 4 960		1000
4			B	8715		S	8700		-1880 x 4 -60	—
5										—
TOTAL # TRADES								TOTAL Profit 1000	TOTAL LOSSES 9,000	TOTAL CUMM NET EQUIT

5

If B-IS IN and IN PRICE < OUT PRICE ⟹ Profit

If B IS IN and IN PRICE > OUT PRICE ⟹ LOSS

If S IS IN and IN PRICE < OUT PRICE ⟹ LOSS

If S IS IN and IN PRICE > OUT PRICE ⟹ Profit

TOTAL # Profit Trades   3

TOTAL # LOSS TRADES   2

$K9 = 1$
$K8 = 2$

$K8$
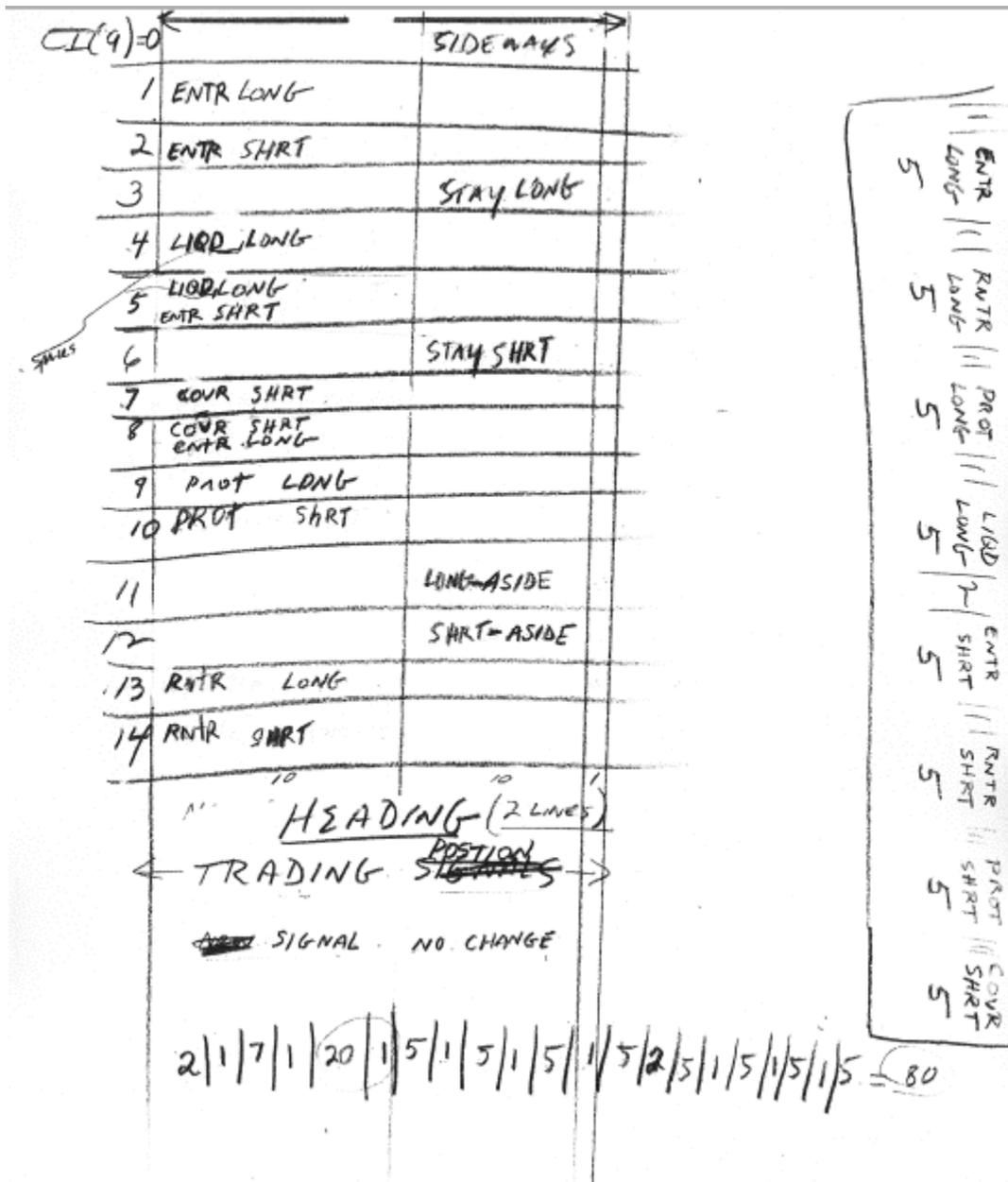
Again, as it is with most proactive visionaries, the technological limitations of his time did not impede his forward movement. Hardware and software were evolving and as they did, Mendelsohn was right there and aware enough to take advantage of Moore's Law, the technological maxim that predicts processor speeds, or overall processing power for computers, will double every two years.

In the mid-to-late 1980s, as the trading-software industry matured, what would soon be referred to as the global economy also began to take shape.

In those early days of the PC genesis and trading-software development, Mendelsohn anticipated another aspect of the burgeoning technology boom. His vision now included an emerging global economy driven by advancements in global

telecommunications including the then yet-to-be-understood Internet technology of the 1980s. This evolutionary step would open the door to high-speed, global-data transmission and globally interconnected economies and financial markets, which in turn would necessitate a new way to analyze markets – intermarket analysis, a revolutionary new take on market analysis.

To Mendelsohn, it no longer made sense to look at a single market in isolation, since in the rapidly evolving financial world, one market would influence another instantaneously, and that market in turn would influence yet another in that moment, and so on. It was no longer productive to calculate and chart linear ratios or differences in the price of just two markets.

In this light, he shifted his research efforts away from the single-market analysis approach that had been the mainstay of technical analysis for the past century and turned it toward intermarket analysis.

Mendelsohn's research over the next few years proved effective in addressing the globalization of the markets and the need to employ intermarket analysis. In 1991, Market Technologies released its second-generation, intermarket analysis software, *VantagePoint Intermarket Analysis Software.* This software, unlike its less robust predecessor, applied the non-linear, pattern-recognition and forecasting capabilities of neural networks to intermarket analysis, marking yet another significant step in the evolution of PC-based technical analysis.

Mendelsohn's introduction of *VantagePoint* signaled a leapfrog evolutionary moment in the trading world. *VantagePoint* demonstrated that software could take advantage of the interconnection between global events and their effects on markets and how those ripples would affect technical analysis.

His approach to intermarket analysis gave him the ability to produce highly accurate, short-term forecasts of market direction for each target market under study, based upon both its own behavior and that of other related markets found to have the greatest impact on each target market.

Recognizing his pioneering work on intermarket analysis, the financial press asked him to present his ideas about the potential risks of globalization and possible adverse effects on the financial markets under strained global economic conditions, in numerous editorial articles.

His editorials in the *Journal of Commerce* in February, 1990 entitled "Build a Global Safety Net"(reproduced below) and in *Futures* in April, 1990 entitled "24-hour trading: Let's do it right" were prescient in identifying a number of systemic risks and proposing possible solutions that regulators, exchanges, clearing houses, and central banks could implement to avoid a future global-financial meltdown.

The Journal of Commerce

Build a Global Safety Net

By Lou Mendelsohn

As the 1990s unfold, the world's financial markets are on the threshold of a technology-driven revolution. Until a few years ago, trading in stocks, stock indexes, futures and options was carried out in isolation within separate time zones on domestic exchanges. Now, the world's three major time zones - the Far East, Europe, and North America - are linked by technology into one 24-hour global market.

When news of an unexpected increase in the U.S. trade deficit, a military incursion in the Middle East or a sudden, sharp drop in stock prices in Tokyo is beamed around the world, multinational corporations, professional money managers, individual investors and speculators react instantly. They seek the best risk-reward payoff by moving enormous amounts of capital from one continent to another, without regard to national allegiance, geographical boundaries, or time of day. Domestically, program traders enact stock-index arbitrage between the New York Stock Exchange and the Chicago Mercantile Exchange's Standard & Poor's 500 at the touch of a button.

Economic, political or military events reverberate throughout the world's financial markets within minutes.

Even an unfounded rumor can set off a chain reaction of responses with immediate worldwide repercussions. In today's electronic environment, time and space are transcended. A rout that may have taken days, weeks or even months to develop in an earlier, less technological age, now can unfold around the world in just a few minutes or perhaps seconds, even as we sleep.

The global market crash of 1987, the financial equivalent of a natural earthquake, underscores the interdependence of the stock and futures markets worldwide. With the imminent introduction of electronic 24-hour trading systems by various futures exchanges, and perhaps even by the New York Stock Exchange, financial aftershocks, more serious than that of October, 1989, may become commonplace in the 1990s, as the "Big One" looms over the financial horizon. Why has this high-stakes game of global 24-hour trading come about? And more importantly, where is it going?

Advancements in satellite telecommunications, the advent of computer-assisted program trading, the 1992 unification of Europe, continued integration of the world's economies and financial markets, the shift toward professional money management and the need by multinational corporations and institutional investors to manage currency, equity, and interest rate risk on a 24-hour basis have converged to bring about the emergence of global electronic trading.

This revolution will have profound and as yet unforeseen effects on both the financial markets and the world as a whole. Right now there are vital security, clearing and regulatory issues that must be resolved to assure the fiduciary integrity of the international financial and banking systems, particularly during times of worldwide financial or political crisis.

A global contingency plan needs to be implemented to cope with potential system malfunctions such as host or terminal failures, communications disruptions and even a system-wide overload. Serious consideration needs to be given to system security to protect against possible acts of terrorism, isolated cases of sabotage and the more mundane problem of computer crime.

Central and international banks will need to develop a 24-hour system of payments and transfers. One possible solution would be to extend the hours of operation of the central banks for the purpose of interbank payments, and to allow settlement in designated currencies several times within the 24-hour trading cycle.

Regulatory agencies worldwide will need to develop greater technical expertise to perform their oversight functions effectively and will need to establish a standardized framework to handle the regulatory requirements of global trading.

The integrity of the world financial and banking systems necessitates that international coordination and cooperation among the various stock and futures exchanges, central banks, finance ministries, regulatory agencies and international banks be implemented through formal agreements and informal understandings. To date, last minute, frantic telephone discussions during a crisis has been the modus operandi.

If these issues are confronted head on, the global electronic markets of the 1990s should function efficiently without heightening the prospect of a major global earthquake on the financial Richter scale. The shock absorbers and circuit breakers recently implemented between the New York Stock Exchange and the Chicago futures exchanges, as well as efforts to curb program trading during periods of adverse market volatility are big steps in the right direction.

Now it's time to extend these efforts internationally to build a solid foundation for the world's financial markets to function effectively during the next decade and into the 21st century.

In two editorial pieces for *Technically Speaking,* the Market Technicians Association newsletter, ("It's Time to Rethink the Role of Technical Analyst" in September, 1991 and "Broadening the Scope of Technical Analysis: The Importance of an Intermarket Perspective" in March, 2001), Mendelsohn called for a broadened definition of technical analysis to include intermarket approaches that could identify and quantify the effects of related global markets on each market traded. The first of these editorials is reprinted below. The second is included elsewhere in this issue.

It's Time to Rethink the Role of Technical Analyst

**MTA Guest Editorial:
Lou Mendelsohn**

For the past two years, Lou has devoted his research to the application of predictive technologies to market analysis.

Over the years, with considerable intellectual interest and occasional amusement, I have followed the debate between technical and fundamental analysts as to which discipline is better at performing market analysis. Proponents of each discipline offer cogent reasons why their approach is the better of the two.

For the past decade, technical analysis, more so than fundamental analysis, has benefitted from advancements in computer hardware and software, focusing for the most part on "single-market" analysis, in which one specific market under investigation is analyzed in isolation using various technical indicators. John Murphy, in his refreshing new book, *Intermarket Technical Analysis*, argues in favor of a broadened scope to include the impact of "intermarkets."

Nevertheless, to date, little progress has been made at synthesizing technical and fundamental analytic approaches, into a combined strategy that can outperform either approach by itself.

One proposed solution to this dilemma has been simply to call a truce, whereby each discipline acknowledges that the other has legitimate inputs into any serious market analysis (see "A Plea to Bury the Technical/Fundamental Debate" by Anne Whitby in the July, 1990 MTA Newsletter). Of course, only lip service is given to this proposal, since each camp firmly believes in its superiority over the other at the challenging task of performing market analysis.

With the integration of today's global markets brought about by advancements in computer and satellite technology, concurrent with the recent application of predictive technologies to market analysis, particularly that of artificial neural computing, the dichotomy between technical and fundamental analysis has become less rigid.

At last, an analytic structure has emerged by which technical and fundamental analysis can be amalgamated. "Neural computing" technology is capable of discerning complex patterns and significant relationships within heretofore seemingly disparate technical and fundamental data, offering the prospect of "superior" analysis through the marriage of both disciplines.

Perhaps it is time for market technicians to engage in serious introspection about the future direction of their profession. Certainly, it would be narrow-minded and shortsighted for us not to examine the role that technical analysis should play in the rapidly changing technological arena of the 1990s.

One possible outcome which could emerge from this self-examination might be a broadened definition of technical analysis. As the boundary between technical and fundamental analysis continues to blur, today's labels "Technical Analyst" and "Fundamental Analyst" may be replaced by the more inclusive title of "Market Analyst" or "Market Strategist," whose purview would encompass both technicals and fundamentals within a robust synergistic analytic framework.

In the 23 years since the first release *of VantagePoint*, Mendelsohn and his research team at Market Technologies have continued to develop and perfect its proprietary mathematical processes and algorithms that now apply intermarket analysis to hundreds of global markets each day. These include commodities, ETFs, stocks, Treasuries, indices, currencies, and metals.

In 2013, the United States Patent and Trademark Office recognized Mendelsohn's novel work, granting him two patents for his invention of technologies that combine intermarket analysis with neural networks to create leading technical indicators which forecast global markets (with an accuracy rate above 80%). His work goes on.

More recently, over the past several years, Market Technologies' R&D team has been developing its next generation trading software platform, *TradeShark.* Currently available on a limited basis to select *VantagePoint* traders who are power-users, *TradeShark* applies Mendelsohn's patented algorithms and processes that integrate global intermarket analysis with trend forecasting.

Throughout this evolution in technical analysis, Mendelsohn has succeeded at tailoring his unique analytic methodologies to meet the challenges of the financial markets of the 21st century. In today's global era, traders must look beyond single-market analysis and trend following or risk extinction.

One man, one moment, sometimes that's all it takes to spark massive transformation, and, sometimes, that one man in that one moment can disrupt the status quo. This is what Mendelsohn has done over and over again for the last forty years. He catalyzed the evolution of the trading software industry, an industry so critical today that no one would trade without utilizing analytical trading software. Neither would he or she look at any market in isolation and make trading decisions without at least paying attention to what's happening in closely related markets.

His influence on the financial world has been featured in articles in *Barron's, Futures, Technical Analysis of Stocks & Commodities, Investor's Business Daily, the Wall Street Journal, Technically Speaking,* and on *CNN, Bloomberg Television, and CNBC.* He has written two books on this subject, collaborated on more than half a dozen books on technical analysis, and has published dozens of articles and editorials on technical analysis and the effects of globalization on the financial markets.

Mendelsohn, a Market Technicians Association member since 1988, introduced so many mutations into the technical analysis, trading-software industry that it is fair to say he is not only a trading software pioneer*,* but, more impressively, has remained a driving force in this arena for four decades. His innovations and achievements in technical analysis and prodigious contributions to the evolution of computerized technical analysis continue today.

Now in his late sixties, Louis Mendelsohn, married 38 years, with three grown sons and four grandchildren, is still active as the CEO of Market Technologies. Although his firm's day-to-day operations are overseen by other executives (including his oldest son, Lane), he still provides his visionary guidance to help create the next generation of trading software, software relying on apps in the cloud or next-generation computers perhaps, or on something as of yet unseen to most people, save for people such as Louis Mendelsohn who will see it and then help foster the evolution process.

Evolution is what happens when an intelligent, motivated, and analytical person discovers his true passion early in life and then devotes the rest of it to pursuing his dream and staying at the forefront of innovations in that field.

Thankfully, Mendelsohn (with his wife, Illyce's, encouragement and support) made the decision to leave the world of hospital administration to devote all of his energies and efforts to technical analysis and trading software development – at a time when very few traders even owned a personal computer or would have known what to do with it. Hospital administration's loss is clearly a big win for technical analysis and traders all over the world.

Brandon Jones is an active trader and writer. He has worked with Lou Mendelsohn's innovations for many years.

Editor's note: this was originally published in the March 2001 issue of Technically Speaking.

With the proliferation of microcomputers and trading software over the past two decades, there has been a surge of interest by futures and equities traders in applying technical analysis to their trading decisions. Concurrently, a transformation has been underway, due in part to advancements in global telecommunications and information technologies, in which the financial markets have become increasingly globally interconnected and interdependent.

Despite the globalization of the financial markets, technical analysis is still directed primarily at analyzing each individual market by itself. This is done utilizing various technical indicators, many of which have undergone little, if any, change in their construction since first being applied by technicians decades ago. These include subjective charting analysis techniques such as head and shoulders, flags, pennants, and triangles, which attempt to find repetitive patterns in single-market data thought to be useful for market forecasting, and objective trend-following indicators such as moving averages, which due to their mathematical construction tend to lag behind market action.

These recent structural changes in the financial markets call into question the efficacy of trading strategies that rely solely upon single-market technical analysis methods and indicators to examine the price movements of individual markets. Now it is imperative to take external effects of related markets into consideration as well. This realization has brought about the emergence of an approach to market analysis, called intermarket analysis, which I have been involved in developing since the mid-1980s.

While most traders today will readily acknowledge that the world's financial markets have become interconnected and influence each other, these same traders will just as quickly admit that they still do not perform intermarket analysis. Instead, they continue to focus on one market at a time, while paying scant attention, if any, to what's occurring in related markets. For instance, a QQQ equities trader or a Nasdaq-100 Index futures trader might keep a cursory eye on one or two related markets, such as Treasury bonds, the Nasdaq Composite, and maybe even crude oil. Typically, this is done by glancing over at price charts of these related markets. Intermarket analysis conducted at this rudimentary level is not amenable to rigorous evaluation or historical testing. While better than not performing intermarket analysis at all, this minimal effort still limits traders' perceptions of what is really happening – and more importantly what is about to happen – in the markets that they are trading. No wonder there is a revolving door of traders who dabble with technical analysis for a while, only to fail at trading.

As the financial markets become increasingly more complicated over the next few years, with the ongoing melding of futures and equities, both domestically and internationally, and the inauguration of futures contracts on individual stocks, traders who continue to restrict their analysis to a single market's past prices (or rely solely upon subjective chart pattern

analysis or trend-following lagging indicators) for clues regarding an individual market's future trend direction, will find themselves at a severe disadvantage. Since the stated purpose of technical analysis is to identify market trends and forecast (or at least extrapolate) their likely future direction, it stands to reason that traders could more easily attain this goal through the use of leading indicators that quantify the simultaneous linkages between markets and their effects on the traded market.

Today's financial markets are an intensely competitive arena, and as in the case of futures markets are a zero-sum game. In this battlefield-like environment predictive intermarket analysis tools - that expand the scope of analysis beyond that of a single-market – demand serious attention by technical analysts and traders. I am not suggesting, however, that traders should quit performing single-market analysis altogether or abandon the use of popular technical indicators such as moving averages which have been the mainstay of technical analysis for decades.

Many widely-used single-market indicators can be adapted to today's global markets. There is no need to throw the baby out with the bath water. Intermarket analysis is not the elusive Holy Grail of technical analysis. The Holy Grail does not exist. Intermarket analysis is simply another facet of technical analysis, and should be implemented in conjunction with single-market analysis. In this way, marginal trades, which are otherwise indiscernible using only a single-market approach, can be identified and thereby avoided, while potentially outstanding trades can be seized upon early in their formation, with greater confidence.

Intermarket analysis brings an added dimension to the analytical framework so that the behavior of each individual market can be examined from without as well as from within. Intermarket analysis is a natural extension of single-market analysis, thereby broadening the definition of technical analysis. This evolution is necessary, given the complexity of today's global financial markets.

Yet, it is quite challenging for individual traders to perform intermarket analysis beyond simply "eyeballing" the charts of two or three related markets. Relatively simple quantitative methods have been developed by technical analysts in the past to measure the effects of related markets on a given market. One such approach, widely used by futures traders, performs a "spread analysis" on two markets to measure the degree to which their prices move in relation to one another. This is accomplished by calculating and comparing the ratio of or difference between the prices over time.

As the number of related markets to be taken into consideration increases, the ineffectiveness of such approaches to analyzing intermarket relationships for trend identification and market forecasting becomes apparent. These methods are limited to price comparisons of only two markets at a time, assume that the effects of one market on another occur without any leads or lags, and that the relationships are linear.

These assumptions are not borne out by how today's global financial markets actually behave. Intermarket linkages between markets are neither fixed nor linear. They are dynamic, and have varying strengths, as well as varying leads and lags to one another that shift over time. Therefore, in order to perform intermarket analysis effectively, more robust mathematical tools need to be employed. One such tool, which I have worked with for more than a decade and found to be very effective, is neural networks.

Neural networks can find reoccurring patterns and relationships within both intra-market and inter-market data. Through a process known as "training", neural networks can be designed to make highly accurate market forecasts of the trend direction of various financial markets. For instance, in order to forecast the short term trend direction of the Nasdaq-100 Index, neural networks can be trained on past market data on the Nasdaq-100 Index itself (including open, high, low, close, volume and open interest), in addition to inter-market data from any number of related markets. These related markets might include the Dow Jones Industrial Average, 30-year Treasury bonds, S&P 500 Index, U.S. Dollar Index, S&P 100, New York Stock Exchange Composite Index, Bridge/CRB Index, Dow Jones Utility Average, and New York light crude oil.

The trend forecasts made by neural networks through their pattern recognition capabilities often forewarn of impending changes in market direction before they would even show up on conventional price charts or could be identified through the use of single-market trend following indicators. One innovative way in which I have been able to amalgamate intermarket analysis with single-market analysis has been to use both intra-market and inter-market data as inputs into neural networks which are then trained to make forecasts of moving averages.

Moving averages have long been recognized by traders and technical analysts as an important quantitative trend identification tool. While the "lag effect" inherent in the mathematical construction of moving averages has continued to challenge technical analysts and market researchers, moving averages are still extensively relied upon by technicians to gauge current market behavior and discern future market direction. If this shortcoming could be eliminated, moving averages could rank as perhaps the most effective trend forecasting tool in the technical analyst's arsenal.

For traders it is critical to know what the market direction is expected to be in the immediate future, since profitable trading decisions are predicated on these expectations being correct more often than not. Unlike yesteryear, it is no longer good enough to find out that a market made a top or a bottom two or three days ago. In today's highly volatile markets even a one day lag can be the difference between profits and losses.

By contrast, if it were possible to forecast accurately, for example, a five-day simple moving average of closes for two days in the future, then the lag effect would be eliminated from a practical trading standpoint. Changes in the trend direction of a market could be identified just before or at the time of their occurrence, not days after the fact.

One approach that I have found highly successful incorporates forecasted moving averages into predictive moving average crossover trading strategies. In this design, the value of a predicted moving average, based upon both intra-market and inter-market data inputs into the training of neural networks, is compared mathematically with the value of a calculated moving average which is based strictly on past single-market prices. The resulting metric indicates the expected market trend direction. When the predicted moving average value for a future date is greater than today's calculated moving average value, the market can be expected to move higher over that time frame. Similarly, when the predicted moving average value for a future date is less than today's calculated moving average value, the market is likely to move lower over that time frame.

For instance, a predicted five-day simple moving average for two days from today can be compared to today's calculated five-day simple moving average. If the predicted average is greater than today's calculated average, this indicates that the

market is likely to move higher over the next two days. The difference between the two moving average values from one day to the next measures the strength of the anticipated move.

Another intriguing application of predicted moving averages is to compare one to another. For example, a predicted five-day moving average for two days from today can be compared to a predicted ten-day moving average for four days from today. When the shorter predicted average is above the longer predicted average (and both are above their respective calculated averages), this is a strong indication of near-term upward movement.

Predictive moving average crossover strategies can be devised to indicate when to enter and exit a position, where to place market or limit orders, and at what price to set trailing stops. Further research on various lengths and types of forecasted moving averages, as well as on the application of optimization techniques to forecasted moving averages, should be conducted.

As the world's financial markets become increasingly intertwined, intermarket analysis will play a more critical role within the overall field of technical analysis in the 21st century, just as back-testing and optimization of single-market trading strategies became integral to computerized technical analysis in the late 20th century. In fact, I can envision the definition of technical analysis broadening even further, in which technical, intermarket and yes, even fundamental data are brought together within one unified (quantitative) analytical framework.

I have previously referred to this paradigm as "synergistic market analysis." This concept expands upon an earlier article of mine published in the September 19991 issue of the MTA Newsletter entitled "It's Time to Rethink the Rile of Technical Analyst." Given the unprecedented transformation of the global financial markets presently underway, open-mindedness on the part of technical analysts accepting a re-definition of technical analysis along these lines is warranted.

Obviously, trend identification and market forecasting will never achieve 100% accuracy, due to randomness and unpredictable events that are inherent in the financial markets, as well as due to the daunting task of developing powerful market forecasting tools. Technical analysis is as much art as science, if not more. Still, it is our responsibility as technical analysts to push the quantitative envelope of financial market analysis as far as possible. That's what makes this arena so intellectually challenging to those of us who are fortunate enough to be involved professionally in technical analysis.