ANDREW W. LO
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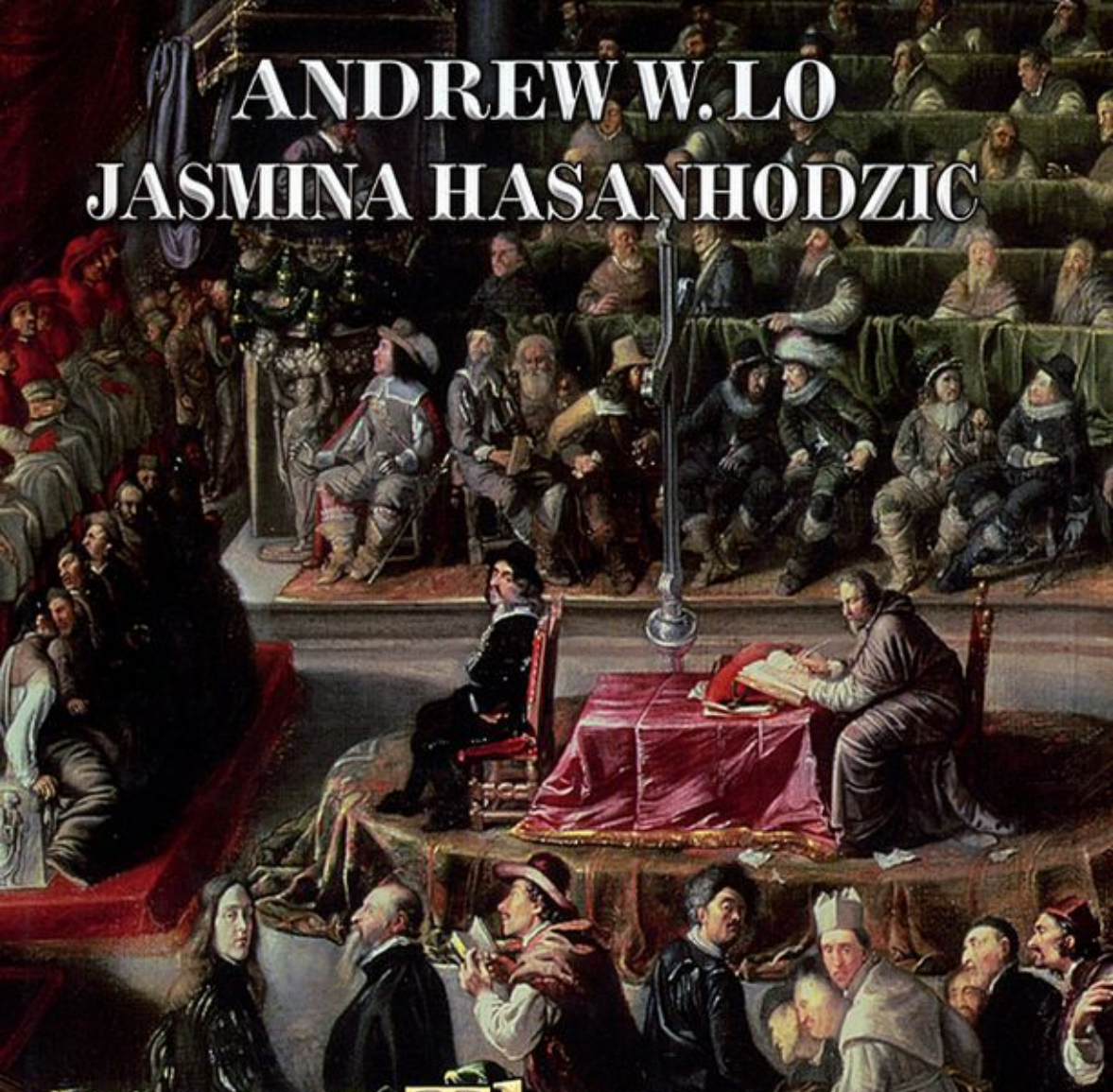

The HERETICS of FINANCE

Conversations with Leading Practitioners of Technical Analysis

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The Heretics of Finance

Conversations with Leading Practitioners of Technical Analysis

by Andrew W. Lo and Jasmina Hasanhodzic

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Conversations with Leading Practitioners of Technical Analysis

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and
Jasmina Hasanhodzic

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To Mike Epstein, a tireless and eloquent champion of technical analysis, who gave this project life and supported us every step of the way

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Acknowledgments

This book is the culmination of countless discussions and debates between us and with various colleagues over the years regarding the pros and cons of technical analysis in theory and in practice. Therefore, we have accumulated a long list of intellectual debts that may never be repaid but which we would like to acknowledge.

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The Market Technicians Association (MTA) has also been very supportive of our various initiatives, and a number of its founders and senior officers have become friends as well as professional colleagues over the years. We hope that this collection of interviews

will further the MTA's mission of making technical analysis more accessible to the broader financial community.

We also wish to acknowledge a small but growing number of academic colleagues who share our fascination with technical analysis, despite the potentially negative consequences that such unseemly interests might yield from the academic community. In particular, we thank Buzz Brock, David Brown, Kevin Chang, Bob Dittmar, Bob Ferguson, Bob Jennings, Blake LeBaron, Harry Mamaysky, Chris Neely, Carol Osler, Stephen Pruitt, Jack Treynor, Jiang Wang, Paul Weller, and Richard White for their open-mindedness and inspirational research on technical analysis in the face of enormous academic skepticism.

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Introduction

How did two technical-analysis dilettantes—steeped in the theory of efficient markets, the random walk hypothesis, and all the other tenets of quantitative finance—end up interviewing fourteen leading technical analysts about their trade? To answer that, we must begin with a disclaimer: we are not practicing technical analysts, or "technicians," as professionals prefer to be called. To those who are familiar either with our research or with technical analysis, this will come as no surprise. But our fascination with the craft and culture of technical analysis, especially as it contrasts with quantitative analysis, has led us down a path of discovery and delight. We have had the pleasure and privilege of meeting with some of the most talented, and the most gracious and decent, individuals in the business.[1] And we have learned a great deal indeed about technical analysis, as it is practiced by the pros.

But how did our paths with these professionals finally cross? After all, technicians do not frequent the halls of academia, nor do they usually consort with finance professors or their students. This separation is understandable, given the disdain and disrespect most academics have for charting, which has been characterized by more than one academic with the following analogy: technical analysis is to financial analysis as astrology is to astronomy. Technicians have, on occasion, made use of astrological signs (see, for example, Weingarten, 1996), a practice which does not help their case.

Despite these misgivings, a number of intrepid academics have studied technical analysis in earnest, some because of prurient curiosity, and others because they realized that the random walk hypothesis is not always consistent with financial data. These studies have come to several interesting conclusions regarding the benefits and pitfalls of technical analysis.[2]

The Death of the Random Walk

Our own initiation into this nether world of practical prognostication began two decades ago when one of us coauthored a paper in which the random walk hypothesis—the notion that past prices cannot be used to forecast future price changes—was resoundingly rejected for weekly U.S. stock returns (see Lo and MacKinlay, 1988). The significance of the random walk hypothesis for technical analysis cannot be overemphasized—the former implies the irrelevance of the latter. If prices follow random walks, then past prices cannot be used to forecast future prices, hence geometric patterns in historical prices contain no useful information for the future. And in 1985, when the research program for that paper began, the random walk hypothesis was still considered gospel truth by the high priests of academic finance. In fact, a number of well-known empirical studies had long since established that markets were "weak-form efficient," in Roberts's (1967) terminology, implying that past prices could not be used to forecast future price changes.[3] And although some of these studies did find evidence against the random walk, for example, Cowles and Jones (1937), they were largely dismissed as statistical anomalies or not economically meaningful after accounting for transactions costs, for example, Cowles (1960). For example, after conducting an extensive empirical analysis of the "runs" of U.S. stock returns from 1956 to 1962, Fama (1965) concluded that ". . . there is no evidence of important dependence from either an investment or a statistical point of view."

It was in this milieu that we (Lo and MacKinlay) decided to revisit the random walk hypothesis. Previous studies had been unable to reject the random walk, hence we surmised that perhaps a more sensitive statistical test was needed, one capable of detecting small but significant departures from pure randomness. In the jargon of statistical inference, we hoped to develop a more "powerful" test, a test that had a higher probability of rejecting the random walk hypothesis if it was indeed false. In retrospect, our more stringent test was quite unnecessary. The overwhelming rejections of the random walk hypothesis obtained for weekly U.S. stock returns from 1962 to 1985 implied that a more powerful test was not needed—the random walk could have been rejected on the basis

of the first-order autocorrelation coefficient, which we estimated to be 30 percent for the equal-weighted weekly returns index! Taken completely by surprise, we carefully rechecked our programs several times for coding errors before debuting these results in a November 1986 conference. How could such compelling evidence against the random walk be overlooked by the vast literature that all finance graduate students are fed?

This puzzling state of affairs caused us (Lo and MacKinlay) to launch a series of investigations to reconcile what we, and many other academics, viewed as a sharp contradiction between our statistical inferences and the voluminous literature that came before us. These follow-on studies are contained in Lo and MacKinlay (1999), and at the end of this long sequence of painstaking investigations—including checking the accuracy of our statistical methods, quantifying the potential biases introduced by nonsynchronous prices, investigating the sources of the rejections of the random walk and tracing them to large positive cross-autocorrelations and lead/lag effects, and considering statistical fractals as an alternative to the random walk—we concluded that "Despite our best efforts, we were unable to explain away the evidence against the random walk hypothesis."

These scientific findings provided the impetus for a more systematic investigation of the efficacy of technical analysis and cleared the path that led to this collection of interviews.

◈ Cultural Biases

Apart from opening the door for technical analysis and other price-based forecasting models, the findings in Lo and MacKinlay (1999) had as much to say about the kinds of cultural biases that academics suffer from: "With the benefit of hindsight and a more thorough review of the literature, we have come to the conclusion that the apparent inconsistency between the broad support for the random walk hypothesis and our empirical findings is largely due to the common misconception that the random walk hypothesis is equivalent to the efficient markets hypothesis, and the near religious devotion of economists to the latter . . . Once we saw that we, and our colleagues, had been trained to study the data through the

filtered lenses of classical market efficiency, it became clear that the problem lay not with our empirical analysis, but with the economic implications that others incorrectly attributed to our results—unbounded profit opportunities, irrational investors, and the like . . . We were all in a collective fog regarding the validity of the random walk hypothesis, but as we confronted the empirical evidence from every angle and began to rule out other explanations, slowly the fog lifted for us."

But we were not the first to comment on the cultural bias of finance academics. *The Education of a Speculator*, Victor Niederhoffer's entertaining and irreverent autobiography, sheds some light on the kinds of forces at work in creating such biases. In describing the random walk hypothesis as it developed at the University of Chicago in the 1960s, he writes (see Niederhoffer, 1997, p. 270):

> This theory and the attitude of its adherents found classic expression in one incident I personally observed that deserves memorialization. A team of four of the most respected graduate students in finance had joined forces with two professors, now considered venerable enough to have won or to have been considered for a Nobel Prize, but at that time feisty as hades and insecure as a kid on his first date. This elite group was studying the possible impact of volume on stock price movements, a subject I had researched. As I was coming down the steps from the library on the third floor of Haskell Hall, the main business building, I could see this group of six gathered together on a stairway landing, examining some computer output. Their voices wafted up to me, echoing off the stone walls of the building. One of the students was pointing to some output while querying the professors, "Well, what if we really do find something? We'll be up the creek. It won't be consistent with the random walk model." The younger professor replied, "Don't worry, we'll cross that bridge in the unlikely event we come to it."
>
> I could hardly believe my ears—here were six scientists openly hoping to find no departures from ignorance. I couldn't hold my tongue, and blurted out, "I sure am glad you are all keeping an open mind about your research." I could hardly refrain from grinning as I walked past them. I heard muttered imprecations in response.

The same kind of cultural bias can explain the current opposition to and skepticism about technical analysis, but with a key difference. There is a fairly wide *linguistic* gap between technicians and the rest of the world. To say that technical analysts are misunderstood is an understatement—many are not understood at all because they speak in a foreign tongue. To appreciate this communications

barrier, consider the following statement that might be found in a typical technician's newsletter:

> The presence of clearly identified support and resistance levels, coupled with a one-third retracement parameter when prices lie between them, suggests the presence of strong buying and selling opportunities in the near term.

For most quantitatively trained academics and investment professionals, this statement carries little meaning and may be mildly entertaining to such an audience because it is so alien. Contrast the above with the following statement which might be found in an academic finance journal publication:

> The magnitudes and decay pattern of the first twelve autocorrelations and the statistical significance of the Box-Pierce Q-statistic suggest the presence of a high-frequency predictable component in stock returns.

Both statements are, in fact, saying the same thing: using historical prices, one can predict future prices to some extent in the short run. But because the two statements are so laden with jargon, the type of response they elicit depends very much on the individual reading them. To be sure, implicit in both statements are procedures for exploiting predictability that do differ considerably. However, because the semantic differences are so great, the authors of the two statements will probably never see how they might both have benefited from each other's insights.

These two hypothetical statements are, of course, oversimplifications of the kinds of tools and logics used by both academics and technicians, but they do illustrate what we consider to be the primary challenge in bringing technical analysts and academics together: finding a common language to exchange ideas. This is the second motivation for these interviews: we hope that allowing leading technical analysts to speak for themselves, but within the structure of interview questions designed by two outsiders with an admittedly strong quantitative bias, might catalyze the interactions between academics and technicians to the benefit of both communities. For example, the technical analyst might find that recent advances in statistical inference can help to identify spurious patterns in the data that occur simply by chance, reducing the number of

"false positives" he falls prey to and increasing the overall accuracy of his forecasts. Similarly, the financial economist might find that technical trading rules contain good approximations of statistical inference for highly complex nonlinear systems and that relatively simple geometric patterns in historical prices can parsimoniously mimic otherwise intractable models of economic equilibrium.

◈ Automating Technical Analysis

The final motivator that led us to this volume is the academic study (Lo, Mamaysky, and Wang, 2000) that provided a detailed statistical analysis of the content in ten technical patterns ranging from head and shoulders to double bottoms, using a large collection of individual U.S. stock returns over a thirty-year period. In formulating the experimental design, we (Lo, Mamaysky, and Wang) acknowledged that we were not practicing technicians and did not have ready access to a team of technical analysts who could identify patterns in the historical record for the purposes of our academic study. Therefore, we proposed a novel method for "automating" technical analysis—developing a simple mathematical description for each type of pattern that can then be encoded in software and applied to large amounts of data. For example, a head-and-shoulders formation can be defined as a sequence of prices with three local maxima separated by two local minima, where the maxima are approximately the same height, the minima are also approximately the same height, and where the height of the maxima exceeds the height of the minima (so that the "neckline" is properly defined).

Armed with these definitions and a particularly flexible method for estimating nonlinear curves (nonparametric kernel regression), we were able to automate the otherwise tedious and time-consuming process of identifying every occurrence of each of the ten patterns for one hundred stocks over a thirty-five-year period. Then we proceeded to ask the following simple statistical question: do postpattern stock returns behave any differently from stock returns drawn randomly? If so, then patterns like the head-and-shoulders formation do provide incremental information about future stock returns; if not, then such patterns are merely random noise that tells us nothing about the future.

The findings were striking. NYSE stocks exhibited mixed results, with some statistically significant patterns among the ten, but a number of insignificant ones as well. However, the Nasdaq stocks told a different story: every one of the ten patterns was statistically significant, implying that all ten technical indicators contained incremental information about future returns. While "incremental information" does not necessarily imply that technical analysis can be used to generate profitable trading strategies—as most technicians would argue—these findings do raise the possibility that technical indicators can add value to the investment process. We concluded by raising an intriguing possibility:

> . . . [O]ur methods suggest that technical analysis can be improved by using automated algorithms such as ours, and that traditional patterns such as head and shoulders and rectangles, while sometimes effective, need not be optimal. In particular, it may be possible to determine "optimal patterns" for detecting certain types of phenomena in financial time series, for example, an optimal shape for detecting stochastic volatility or changes in regime. Moreover, patterns that are optimal for detecting statistical anomalies need not be optimal for trading profits, and vice versa. Such considerations may lead to an entirely new branch of technical analysis, one based on selecting pattern recognition algorithms to optimize specific objective functions.

To understand how this new branch of technical analysis might emerge, we must go back to the ultimate sources of inspiration, motivation, and innovation. This is why we undertook the challenge of interviewing leading technicians about their craft.

◈ What Did We Learn from the Interviews?

All the technicians we interviewed came across as highly intelligent, rational, and open-minded individuals, with a deep understanding of the markets. Highlighting the unconventional is hardly the best way for technicians to have their voices heard in the markets, although many of the most successful of them are well aware that much of the prejudice against them can be countered by careful communication of their ideas and avoidance of the technical jargon.

Most of the technicians we interviewed agree that their practice of technical analysis is based on intuition 10 to 50 percent of the

time. Though Laszlo Birinyi, for one, argues that his decision making is for the most part automated, with intuition playing a minimal role, their practice of the craft seems largely intuitive. Judgment plays a role in deciding how exactly to design one's models and which ingredients to use. In John Murphy's words, "It's not so much a particular indicator, it's how you put it all together that matters," and the most successful at this synthesis are those who, through experience, have gained perceptive insight into how the economy and the markets function.

Several of the technicians argue that the ability to successfully integrate all the pieces of information that go into price analysis cannot easily be taught. As Murphy puts it, "I'm not sure I could explain to you how I do what I do. I look at many things in a short interval of time and come to a conclusion." That elusive skill may explain why these practitioners do not have a problem with sharing their knowledge, the tools they develop, or the strategies they pioneer. There is no single right way to put it all together. Everyone does it in slightly and sometimes widely different ways. In fact, some technicians operate best in complete isolation from the outside world—Linda Raschke, who does not watch television or read the *Wall Street Journal,* is a prime example. Others prefer to complement their technical perspectives with fundamental, economic, and political ones. Certainly, each of them starts from a very different place, and the differences in personality types among successful traders (Raschke, Weinstein), educators (Murphy, Acampora), long-term investors (Desmond, Deemer), artist technicians (McAvity), highly eclectic technicians (Dudack), historians (Shaw, Acampora), long-term market theme writers (Farrell), and those who insist on being labeled market analysts rather than technical analysts (Farrell, Birinyi) are striking, and emerge clearly from the substance and tone of the interviews.

These observations illustrate the striking heterogeneity among leading technicians, and also yield a potential explanation for the lack of impact that technical analysis has had on the broader financial community. Without a unified, standardized, and broadly recognized body of knowledge in which every practicing technician must be conversant, it is difficult to see how technical analysis can spread. The advent of the Chartered Market Technician (CMT) Program by the Market Technicians Association (MTA) is a step in

the right direction, but as our interview subjects underscore, there is still a considerable amount of art and subjectivity in the practice of technical analysis. For example, their responses to the question "Does the lack of hard-and-fast rules in technical analysis ever bother you?" varied from "That's exactly what bothers me" to "But there *are* hard-and-fast rules in technical analysis." On this particular issue, the answer we got depended on how the individual interpreted the question—although certain rules can indeed be taught, the synthesis of rules and the interpretation of the results are based on practitioners' own experiences and perceptions, and hence are not hard-and-fast. Consequently, if technical analysis continues to be practiced the way it is practiced today, it will be a long time before quantitative algorithms become sophisticated enough to replace a human technical analyst. "This is still a human game," says Farrell.

As Alan Shaw points out, good practitioners are asking the right questions while not necessarily providing any answers. How do they know what the right questions are? They look to history. Perceptive technicians who have lived through or at least studied previous bull and bear markets are able to discern connections between the current phenomenon and the precedent. Since history tends to repeat itself, this enables them to focus their thinking in the right direction. Academics attempting to dissect and systematize technical analysis have their work cut out for them.

The technicians we interviewed were clearly frustrated that their craft is not more widely recognized by the institutional and academic establishments. John Murphy's and Paul Desmond's candid admission of their disappointment over the widely perceived inferiority of technical analysis to other forms of financial analysis, Ralph Acampora's efforts to gain wider acceptance of MTA-administered certifications, Robert Farrell's and Laszlo Birinyi's refusal to be labeled "technicians," and Birinyi's publication of the pamphlet titled *The Failure of Technical Analysis* are just a few telltale signs of their displeasure with the aura of skepticism attached to their field. Indeed, the very fact that these successful practitioners willingly spent three hours of their precious time being interviewed by us demonstrates their desire to be heard.

Contrary to the tendency to deny their displeasure at the widespread suspicion with which their craft is viewed, the practitioners

we spoke to openly voiced their concern with what they see as the academic world's "reinvention," via behavioral finance, of technical analysis. In many instances, academic definitions and technical practices closely mimic each other. For example, the *representativeness heuristic* of Tversky and Kahneman (1974) echoes the technicians' emphasis on drawing on the historical phenomena to understand the current ones.[4] However, while critical of work that tries to "reinvent the wheel," technical analysts support the research efforts that take active interest in what they do and which they hope will earn the field the respect they consider long overdue.

A New Beginning

Since we are only now beginning to explore the many aspects of technical analysis that may be relevant for our academic research agenda, we cannot yet say what kind of common language will emerge between academics and technicians. However, we hope these interviews and our ongoing work contribute to the development of such a language. We have no doubt that by pooling their respective bodies of knowledge and by reconciling their seemingly antipodal modes of inference and discovery, both the academic and the technician can profit enormously.

For too long, academics have ignored technical analysis, and technicians have ignored the discipline and structure of rigorous scientific inquiry. But, as Shakespeare wrote, "The fault . . . lies not in our stars, but in ourselves . . ." Although it may be too much to ask of our academic colleagues to start studying astrological signs, just as it may be too much to ask of technicians to start proving theorems, we do think that the stars are aligned for more meaningful dialogue between the two communities, and we hope these interviews will serve as a starting point.

Notes

1. The interviews in this volume were conducted throughout 2004 and in the first half of 2005, so the references to current events made by the interviewees should be interpreted in that context.
2. Examples include Treynor and Ferguson (1985), Pruitt and White (1988), Neftci (1991), Pau (1991), Brock, Lakonishok, and LeBaron

(1992), Neely, Weller, and Dittmar (1997), Neely and Weller (1998), Chang and Osler (1994), Taylor (1994), Osler and Chang (1995), Allen and Karjalainen (1999), and Lo, Mamaysky, and Wang (2000).

3. See, for example, Cowles and Jones (1937), Kendall (1953), Osborne (1959, 1962), Roberts (1959, 1967), Larson (1960), Cowles (1960), Working (1960), Alexander (1961, 1964), Granger and Morgenstern (1963), Mandelbrot (1963), Fama (1965), and Fama and Blume (1966).
4. Indeed, each and every participant emphasized the importance of studying the history of the markets. Laszlo Birinyi even goes to the extent of collecting and analyzing major newspaper articles that appeared over the last seventy years.

1

Ralph J. Acampora

When you're practicing technical analysis, you have to be totally eclectic, because there will be a time when the approach you're using doesn't work. If you're not flexible, you'll self-destruct.

With forty years of experience, Ralph J. Acampora has been instrumental in the development of modern-day technical analysis. He is the New York Institute of Finance's (NYIF) director of technical analysis studies and has taught at the institute for thirty-seven years. Before joining NYIF, he was director of technical research at Knight Equity Markets and worked for fifteen years at Prudential Equity Groups as its director of technical analysis. His career has included positions at several of the financial industry's top firms, including Kidder Peabody and Smith Barney.

One of Wall Street's most respected technical analysts, Acampora is regularly consulted for his market opinion by major business news networks as well as national financial publications, and he has been consistently ranked by *Institutional Investor* for more than ten years. He is a chartered market technician (CMT), a designation he helped create and which is now recognized by the National Association of Securities Dealers (now FINRA) as the equivalent of a chartered financial analyst (CFA).

Acampora cofounded the Market Technicians Association (MTA) in 1970, is a past president of that group, and continues to be an active member of the society. He also founded and was the first chairman of the International Federation of Technical Analysts (IFTA), comprising more than four thousand colleagues around the world. As an educator, Acampora also participates in the Securities Industry and Financial Markets Association's annual Wharton seminars.

Acampora is a trustee on the Board of the Security Industry Institute (SII) and is involved in the establishment of the Securities Traders

Association University (STAU). He is the coauthor of the CMT examination and the author of the book *The Fourth Mega-Market, Now Through 2011: How Three Earlier Bull Markets Explain the Present and Predict the Future.*

What led to your interest in technical analysis?

I came to Wall Street in 1966 after a couple of years in a Catholic seminary. My educational background is in history and political science, and I worked on a master's degree in theology, so I had absolutely no background in this business. I had a major spinal fusion operation, which ended my theology studies. My father's best friend was William Downe, who was a specialist on the floor of the New York Stock Exchange, with a firm called Spear, Leads & Kellogg. Bill Downe was able to get me a very fine back surgeon. Every day Mr. Downe would come to the hospital and visit with me, and he'd have publications like the *Wall Street Journal*, *Forbes* magazine, *Barron's*. I was in a body cast for three months, so I was like a little inverted turtle. Downe would throw everything he was reading on the bed. I was a captive, so for three months I read all this stuff about Wall Street.

When they took the cast off, I told him I was not going back into the seminary, and he asked me what I wanted to do with my life. I told him I enjoyed reading the stuff he had given me. "That's research," he said. That was in the mid-'60s, and research was in its very formative stages in those days.

Mr. Downe introduced me to Bill Grant at Smith Barney, which was probably one of the first brokerage firms to create what we know today as modern fundamental research. Grant told me to get an MBA, come back, and he'd give me a job. But I had had many, many years of schooling. I was twenty-seven years old. I didn't want to go back to school. That frustrated Mr. Downe because he couldn't help me. I didn't have the fundamental background for research.

I was still on crutches, and I literally hobbled around Wall Street. I went from job interview to job interview. After a while, I realized I wanted to be an analyst. Finally, I interviewed at a firm called Distributors Group, which was a small mutual fund, and they hired me. My working day was split in half. The first half was devoted

to maintaining a point-and-figure chart library of more than two thousand charts that I did by hand. The second half was devoted to calculating price-to-earnings ratios for companies our firm had an interest in. I was spending half of my life doing technical analysis and the other half doing fundamental analysis. These people were so kind and wonderful that they kept pushing me, and I apparently excelled at technical analysis.

The man who started this mutual fund at Distributors Group was Harold X. Schreder, who had been an economic adviser to President Eisenhower. Mr. Schreder ran a very successful business and he insisted that every portfolio manager plot the stocks they owned in their respective portfolios. Every Thursday we would meet, and portfolio managers would stand with charts of the stocks that they owned in their portfolios. If anything looked suspicious on a chart, people would whistle, make noises, and say, "Hey, how can you own that ugly thing?" That was discipline. That was my first introduction to technical analysis. It was in the late '60s.

By 1968 they sent me to the New York Institute of Finance, so that one day I might become a portfolio manager. The New York Institute of Finance is a school of Wall Street, and I took a series of classes. One of the classes was taught by Alan Shaw. Alan became my mentor and dear friend. We started working together in October 1969. I can't begin to tell you how much Alan taught me.

Around 1970, Alan was to have lunch with a man named John Greeley. John was also running a technical department, and he had a young fellow with him by the name of John Brooks. Alan couldn't make the lunch, so he sent me. At that luncheon Brooks and I asked each other, "Who do you know in technical analysis?" I told him about Alan Shaw, and he knew a fellow by the name of Bob Farrell at Merrill Lynch. Those were important names, and that was the beginning of the Market Technicians Association. It was actually John Brooks and I, with a little help from Greeley, who started it. In those days the only place Wall Street analysts met corporate America was at the New York Society of Security Analysts. Getting a ticket to go to a luncheon to listen to the chairman of General Motors was virtually impossible for junior analysts like us. All of the fundamental analysts had their own little groups—the chemical analysts met, the drug analysts met, and the oil analysts met—to share their ideas. Technicians never met because we