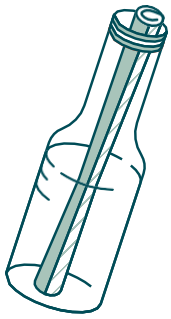


2023 CMT LEVEL I: An Introduction to Technical Analysis

Learning Objective Statements
Sample Questions

Level I: Learning Objective Statements

A list of Learning Objectives appears at the beginning of each chapter in the CMT Level I text. These are intended as a guide to the most important concepts discussed in the chapter and they are prime material for the exams. The following is a chapter-by-chapter list of the CMT Level I Learning Objectives.

Section One: Theory and History of Technical Analysis

1 The Basic Principle of Technical Analysis - The Trend

Define what is meant by a trend in technical analysis
Explain why determining the trend is important to analysts
Identify primary, secondary, short-term, and intraday trends
Describe the basic beliefs behind the art of technical analysis
Define “fractal” as used in describing price action

2 Dow Theory

Describe the history of Dow Theory
Discuss the basic principles of Dow Theory
Identify the three basic types of trends identified in Dow Theory as defined by time: primary, secondary and minor
Identify the three basic trend patterns of all prices: upward, downward, and sideways
Describe the “ideal market picture” according to Dow Theory
Express the concept of confirmation in Dow Theory
Explain the role of volume in Dow Theory

3 Introduction to Charts, Part 1

Explain how a technical analyst uses charts to summarize price action
Discuss the advantages of reviewing price information in chart format
Identify the four basic price points represented in charting
Describe how to construct line, bar, and candlestick charts
Identify the components of individual candles: real body and shadows
Review the information available in line, bar, and candlestick charts
Describe what is meant by “data interval”
Define “range” as it applies to prices on a bar or candlestick chart
Define “fractal” and how it relates to chart construction

4 Introduction to Charts, Part 2

Identify the variables plotted on the axes in a conventional price chart
Explain the differences between arithmetic and logarithmic scales and their uses
Describe typical methods for displaying volume in a price chart
Discuss volume as an alternative to time on the x-axis of a chart

Section Two: Charts, Trends and Patterns

5 Trends - The Basics

Explain why trend identification is important to achieve profits
Recognize an uptrend, a downtrend, and a trading range
Describe the concept of support and resistance, and the underlying psychology
Identify trends using most common methods
Recall how significant reversal points are identified
List general rules for trendlines

6 Breakouts, Stops and Retracements

Describe and identify breakouts
List methods for confirming and filtering breakouts
Explain the purpose of entry and exit stops
Describe methods for setting entry and exit stops
Define retracements, pullbacks, and throwbacks

7 Moving Averages

Describe the basic principle of moving averages
Explain how to calculate simple, linearly weighted and exponentially smoothed moving averages
Identify trends and signals with moving averages
Describe and interpret Directional Movement Indicators
List common envelope, channel, and band indicators and their characteristics

8 Bar Chart Patterns

Define what is meant by “chart patterns”
List common characteristics of patterns
Discuss opposing viewpoints over whether patterns exist
Describe the influence of computer technology on price-pattern study
Identify classic chart patterns such as triangles, and double and triple tops and bottoms
Identify rounding chart patterns such as head-and-shoulders
Identify “half-mast” chart patterns such as flags and pennants

9 Short-Term Patterns

Locate reversals in longer-term trends using short-term price patterns
Describe the types of gaps that occur on price charts and their significance
Recognize wide-range and narrow-range bars and their implications for volatility
Identify one- and two-bar reversal patterns
Identify common candlestick patterns and their significance within a trend

10 Introduction to Volume Analysis

Define volume
Define open interest
Define the terms related to volume as discussed in this chapter
Describe how volume provides information on liquidity and participation
Describe how volume adds perspective to price action

11 Volume: The Technician's Decryption Device

State the implications of volume changes for price trends
Identify trends in price and volume in a chart
Describe how volume is displayed in a Volume-at-Price chart
Define VWAP
Describe Equivolume charts
Explain how open interest rises and falls
State the implications of open interest changes for price trends

12 An Introduction to Volume Indicators

List the seven types of volume indicators
Describe the major differences among the types of volume indicators

13 Confirmation

Define terms including overbought, oversold, failure swings, divergence, and reversal
List the major indexes and oscillators designed to use volume as confirmation
Describe open interest and how it might be used for confirmation
Explain the concept of momentum in price action
Identify characteristics and applications of indexes and oscillators such as MACD, RSI, and stochastics

14 Candlestick Charting Essentials

Describe strengths and limitations of candle charts
Identify the components of individual candle lines - real bodies and shadows
Explain how candles depict the high, low, open, and close of a trading period
Identify candle confirmations of support and resistance

15 Point-and-Figure Charting

List three important characteristics of point-and-figure charts
Define “box size” and “reversal”
Describe how point-and-figure charts are constructed
Explain the importance of box size to the sensitivity of point-and-figure charts
Review the construction of various box size and reversal point-and-figure charts
Identify common point-and-figure patterns
Explain how trendlines are drawn on point-and-figure charts
Locate basic signals on a point-and-figure chart
Describe how price targets are obtained using a horizontal or vertical count on a point-and-figure chart

Section Three: Advanced Concepts in Charting and Trend Analysis

16 Introduction to the Wave Principle

Describe the basic operating theory of the Wave Principle
Define motive waves and corrective waves
Identify types of motive waves such as impulse, extension, and diagonal
Identify types of corrective waves such as zigzag, flat, and triangle
Label waves using standard Elliott Wave notation
Describe Fibonacci relationships as applied to Elliott Wave analysis

17 The Anatomy of Elliott Wave Trading

Match the waves as labeled on a chart to the description in the text
List the waves considered the most advantageous to trade
Describe trade signals associated with various wave patterns

18 Measuring Market Strength

Explain the concept of divergence
Define market breadth
Identify signals of change in market breadth using the advance-decline line
Describe other measures of internal stock-market strength such as McClellan's calculations
Explain the use of volume in measuring stock-market strength
Identify measures of stock-market strength from new high and new low data
Describe measures of stock-market strength based on the number of stocks priced above their moving average

19 Foundations of Cycle Theory

Name the two types of cycles
Identify the three defining characteristics of a cycle
List and define Hurst's seven Principles of Commonality
Define a composite wave
Identify left and right translation
Describe a dominant cycle
Recall the tools that aid in cycle identification

20 Basics of Cycle Analysis

Explain how the annual cycle conforms to cycle theory
Describe two methods of detrending price data
Restate common seasonal tools
Memorize notable economic cycles and their periods
Recall some sequences/nonlinear cycles

Section Four: Markets and Volatility

21 Markets, Instruments, Data, and the Technical Analyst

Name four asset classes amenable to technical analysis
List five tradeable instruments that a technician is likely to employ
Describe data-handling issues with which a technician should be familiar

22 Equities

Define equity securities and primary data types
Describe the benefits of equities for investors
Identify the effect of corporate actions on price data
Classify sectors, capitalization and other ways to segment the market

23 Indexes

Identify major global equity indexes
Name common non-equity indexes used by technical analysts
Explain weighting methods used in major indexes
Define “survivorship bias”

24 Fixed Income / Bonds

List the major types of issuers of debt securities
Identify the basic terms of a debt instrument: issuer, coupon, maturity
State the ways in which debt prices are expressed
Explain the relationship between price and yield
Define “yield curve”
Describe the importance of US government debt in the pricing of other debt securities: “yield (or credit) spread”

25 Futures

Explain the purpose of futures markets
Classify various futures markets as industrial, agricultural, financial, and so on
List the major terms of a futures contract
Define open interest in futures
Describe challenges technicians face when using futures market data

26 Exchange-Traded Products (ETPs)

Define an exchange-traded product
Review differences between exchange-traded funds (ETFs) and exchange-traded notes (ETNs)
Describe the uses for leveraged ETPs

27 Foreign Exchange (Currencies)

Identify the base and quote currencies in a pair
Classify currency pairs as “major” or “cross”
Discuss the impact on technical analysis of the “dealer market” system of currency trading
Explain the data used in building currency charts
Describe cryptocurrencies

28 Options

Explain the purpose of options markets
List the major terms of an option contract
Describe “the Greeks”
Define implied volatility

29 Understanding Implied Volatility

Explain the difference between historical and implied volatility
Describe the concept of put-call parity
Discuss how implied volatility may be used to estimate price movement
State how to calculate single-day implied volatility

30 About the VIX Index

Describe the components of the VIX index
Explain the implications of a rising or falling VIX index
State how to calculate expected 30-day market movement

Section Five: Behavioral Finance and Other Theories of Market Dynamics

31 What is the Efficient Market Hypothesis

Identify the basic concept of the Efficient Market Hypothesis (EMH)
Describe the three forms of the EMH
Explain the characteristics of stock prices as a martingale
Describe how randomly generated output can appear non-random and how that might relate to asset prices and returns
Identify the three areas in which behavioral finance challenges the EMH

32 The Forerunners to Behavioral Finance

Explain momentum strategies and mean-reversion strategies
Define the general concept of value investing
Describe why value investing is similar to a mean-reversion approach
Explain how value investing (Graham and Dodd) conflicts with the EMH

33 Noise Traders and the Law of One Price

Define “fungibility” in the context of financial markets
Explain “arbitrage”
Describe “noise” vs. “information”
Define “noise trader”

34 Noise Traders as Technical Traders

Explain why technical traders are considered a specific type of noise trader
Describe the actions of technical traders as noise traders in the context of market valuation

35 Academic Approaches to Technical Analysis

Describe how technical analysis remains relevant despite the EMH
Discuss how the Adaptive Market Hypothesis reconciles the EMH with technical and behavioral factors

36 Market Sentiment and Technical Analysis

Define “sentiment” as it relates to financial markets
Discuss the importance of the “crowd”
Describe the challenges of using sentiment indicators

37 Sentiment Measures from Market Data

Describe the VIX as a sentiment measure
Explain the use of options volume and open interest as sentiment indicators
Describe the use of futures open interest in gauging sentiment
Identify the three primary groups in the Commitments of Traders report
Define short interest
Explain insider activity as a sentiment indicator

38 Sentiment Measures from External Data

Describe the use of news and advisories as sentiment measures
Explain the concept of contrary opinion
Indicate how mutual fund cash and other funds measures are used to gauge sentiment

Section Six: Basic Statistics for the Technical Analyst

39 Introduction to Descriptive Statistics

Describe the three most common measures of central tendency: mean, median and mode
Discuss alternative methods of calculating the mean and their uses
Describe what is meant by “measures of dispersion”
Explain two measures of dispersion: standard deviation and variance
State the value of data visualization as a complement to descriptive statistics

40 Introduction to Probability

Define probability
Explain the impact of the law of large numbers on a series of outcomes
Define random variable and the phrase “independent and identically distributed”
Describe a normal probability distribution
Identify skew and kurtosis

Section Seven: Perspectives on Technical Trading Systems

41 Objective Rules and Their Evaluation

Describe objective and subjective methods in technical analysis
Define “rule” as used in trading systems
Explain binary rules as well as individual and multiple thresholds
Identify traditional rules and inverse rules
Discuss the importance of benchmarking in evaluating trading rules
Describe the key components of “trading costs”
Describe the value of using detrended prices

42 Being Right or Making Money

List the four key characteristics Ned Davis claims are common to successful investors
Describe the importance of having plans to persevere through mistakes and losses
Identify Ned Davis’ nine rules to consider when building a timing model
Discuss the theory behind “contrary opinion”

43 The Model Building Process

Describe “internal” and “external” indicators
Explain the use of valuation indicators as sentiment measures
Describe the basic relationships of economic growth, Fed policy, and money supply
Discuss the use of moving average signals based on “crossings” and “slopes”
Explain the use of price momentum and indicator momentum
Identify the problem of curve-fitting, or overoptimization

44 Relative Strength as a Criterion for Investment Selection

Define relative strength
Explain the value of relative strength in analyzing stock price movements
List several relative strength ratios that may be calculated
Identify some of the limitations of relative strength in investment decisions

Level I: Sample Questions

The following sample CMT Level I questions offer a glimpse into the style and scope of the exam. Each of the sample questions is followed by a relevant excerpt and citation from the 2023 CMT Level I curriculum. These 15 samples are by no means a study guide; instead, consider them a taste of what a Level I candidate will learn to master this segment of the body of knowledge.

Important points to note --

- The CMT Level I exam tests on introductory concepts and definitions in technical analysis.
- The actual exam consists of 132 multiple-choice questions of which 120 are scored items. The remaining 12 questions are under trial for future use.
- Candidates have two hours to complete the 132 questions on the exam.
- The exam is delivered on a computer in Prometric testing facilities, or through Prometric's ProProctor remote-proctoring service. Please be sure to schedule your exam well in advance.
- The CMT Association has adopted the CFA Institute Code of Ethics and Standards of Professional Conduct ("Code and Standards") as its ethics guide. Questions on the Code of Ethics and Standards of Professional Conduct appear on all three levels of the CMT exams. The Standards of Practice Handbook is a valuable study guide for the Code and Standards. Please use those documents as ethics are not otherwise included in the CMT Program textbooks.

Knowledge Domain: Theory and History

1. According to the work of Charles Dow and his successors, now referred to as Dow Theory, which of the following is NOT a hypothesis for the nature of markets and technical analysis?

A. The primary trend is inviolate.
B. The averages discount everything.
C. Dow Theory is not infallible.
D. Prices move at random.

> "Rhea presented three hypotheses:
> 1. The primary trend is inviolate.
> 2. The averages discount everything.
> 3. Dow Theory is not infallible."
>
> -- Kirkpatrick and Dahlquist
> CMT Level I Curriculum (2023) Chapter2
> Learning Objective: Discuss the basic principles of Dow Theory

D. Prices move at random.

2. In relation to the principles of technical analysis, the phrase "patterns are fractal" refers to the assumption that

A. patterns tend to break existing trends.
B. Mandelbrot originated the concept of chart patterns.
C. pattern analysis is universal and independent of time.
D. chart patterns found in an intraday chart can generate signals in a daily chart.

> "This ability for trends to act similarly over different periods is called their fractal nature. Fractal patterns or trends exist in nature along shorelines, in snowflakes, and elsewhere. For example, a snowflake is always six-sided—having six branches, if you will. … The trading markets are similar in that any period we look at—long, medium, or very short—produces trends with the same characteristics and patterns as each other. Thus, for analysis purposes, the length of the trend is irrelevant because the technical principles are applicable to all of them. The trend length of interest is determined solely by the investor's or trader's period of interest."
>
> -- Kirkpatrick and Dahlquist
> CMT Level I Curriculum (2023) Chapter 1
> Learning Objective: Define "fractal" as used in describing price action

C. pattern analysis is universal and independent of time.

Knowledge Domain: Market Indicators

3. The TRIN, or Arms Index, is calculated by

A. dividing total specialist short sales by total short sales.
B. subtracting the 26-day simple moving average from the 12-day simple moving average.
C. subtracting the advance/decline ratio from the ratio of advancing volume to declining volume.
D. dividing the advance/decline ratio by the ratio of advancing volume to declining volume.

> "One of the most popular up and down volume indicators is the Arms Index, created by Richard W. Arms, Jr. (winner of the MTA 1995 Annual Award). The Arms Index (Arms, 1989), also known by its quote machine symbols of TRIN and MKDS, … measures the relative volume in advancing stocks versus declining stocks. When a large amount of volume in declining stock occurs, the market is likely at or close to a bottom.
> Conversely, heavy volume in advancing stocks is usually healthy for the market. The Arms Index is actually a ratio of two ratios, as follows:
> Arms Index = (Advances / Declines) / (UpVolume / DownVolume)
> The numerator is the ratio of the advances to declines, and the denominator is the ratio of the up volume to the down volume."
>
> -- Kirkpatrick and Dahlquist
> CMT Level I Curriculum (2023) Chapter 18
> Learning Objective: Describe other measures of internal stock-market strength such as McClellan's calculations

D. dividing the advance/decline ratio by the ratio of advancing volume to declining volume.

4. If the VIX is quoted at 20, it indicates the market is expecting a movement of about _____ percent over the next 30 days.

A. 3.77
B. 5.77
C. 3.33
D. 5.07

> "To determine the anticipated 30-day movement of the stock market as defined by the VIX involves dividing the VIX by the square root of 12. … The square root of 12 is a convenient number as 30 days is the average month and there are 12 months in the year. In a similar manner to breaking down what implied volatility was indicating about movement in Amazon stock, the VIX may be used to determine the anticipated 30-day move for the S&P 500. If the VIX is quoted at 20, the result would be the market expecting movement of about 5.77 percent over the next 30 days. Following the formula for determining 30-day market movement, the math would be:
> 5.77% = 20/3.46"
>
> -- Rhoads CMT
> Level I Curriculum (2023) Chapter 30
> Learning Objective: State how to calculate expected 30-day market movement

B. 5.77

Knowledge Domain: Construction

5. When analyzing long-term price movements, it could be helpful to use _____ chart.

A. a logarithmic
B. a candlestick
C. an EquiVolume
D. a point and figure

"As a rule of thumb, long-term charts that represent data exceeding a few years should be plotted on logarithmic scales. Also, many analysts find that when a graph depicts a security with price movements of more than 20%, a logarithmic scale is more useful than an arithmetic scale."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 4
Learning Objective: Explain the differences between arithmetic and logarithmic scales and their uses

A. a logarithmic

Knowledge Domain: Trend Analysis

6. An exponential moving average

A. gives more weight to the most recent observation.
B. gives less weight to the most recent observation.
C. gives equal weight to all observations.
D. does not suffer from any lag.

"…in certain situations, the most recent stock price may have more bearing on the future direction of the stock than the ten-day old stock price does. If observations that are more recent contain more relevant information than earlier observations, we want to weight data in favor of the most recent observation. By calculating a weighted moving average, the most recent day's information is weighted more heavily. This weighting scheme gives the most recent observation more importance in the moving average calculation."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 7
Learning Objective: Explain how to calculate simple, linearly weighted and exponentially smoothed moving averages

A. gives more weight to the most recent observation.

7. Violated support levels typically

A. lose importance after three weeks.
B. indicate an imminent price reversal.
C. lose importance after three months.
D. become resistance.

"The concept of support and resistance presumes that in the future prices will stop at these recorded levels or zones and that they represent a remembered psychological barrier for prices. The zones will carry through time and become barriers to future price action. Not only will the zones carry through time, but once they are broken through, they will switch functions. Previous support will become resistance, and previous resistance will become support."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 5
Learning Objective: Describe the concept of support and resistance, and the underlying psychology

D. become resistance.

8. A narrowing of Bollinger Bands normally indicates that

A. a stock is ready for a rally.
B. a stock is ready for a decline.
C. a stock's volatility has increased.
D. a stock's volatility has decreased.

"Bands are also envelopes around a moving average but, rather than being fixed in size, are calculated to adjust for the price volatility around the moving average. They, thus, shrink when prices become calm and expand when prices become volatile. The most widely used band is the Bollinger Band, named after John Bollinger (2002)."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 7
Learning Objective: List common envelope, channel, and band indicators and their characteristics

D. a stock's volatility has decreased.

Knowledge Domain: Chart and Patterns

9. A breakaway gap usually

A. provides a major divergence signal.
B. signals the beginning of a new trend.
C. occurs at the end of an important price move.
D. occurs during the accumulation phase of the market cycle.

"… prices suddenly break through a formation boundary and a major change in trend direction begins. Breakaway gaps signal that a pattern is completed and a boundary penetrated."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 9
Learning Objective: Describe the types of gaps that occur on price charts and their significance

B. signals the beginning of a new trend.

10. A flag is generally formed by a _____ in a bull market or a _____ in a bear market.

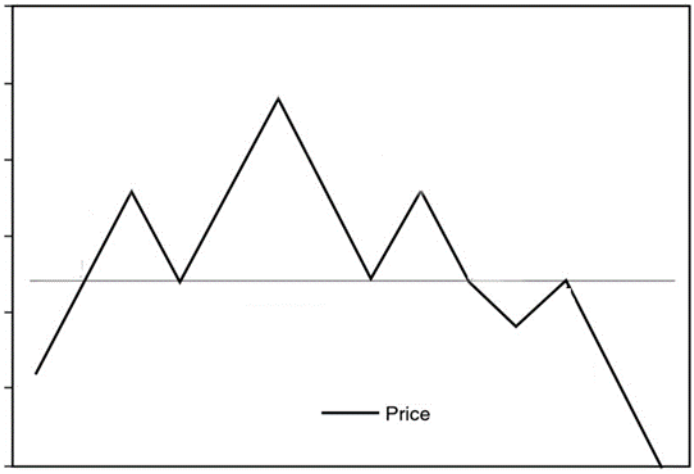
A. rally, pullback
B. rally, correction
C. correction, rally
D. correction, throwback

"Flags and pennants are really variations of the same formation. The flag is a short channel that usually slopes in the opposite direction from the trend."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 8
Learning Objective: Identify "half-mast" chart patterns such as flags and pennants

C. correction, rally

11. Identify the chart formation below.



A. triple top
B. rising wedge
C. rounding top
D. head and shoulders top

"The head-and-shoulders pattern is probably the most famous technical pattern. Its name is often used when ridiculing technical analysis, yet its profitability is high, relative to other patterns, and it is one of the few that the Lo, Mamaysky, and Wang (2000) study showed had statistical significance.

The head-and-shoulders top pattern is a series of three well-defined peaks, either sharp or rounded. The second peak is higher than the first and third peak. This middle, higher peak is called the head. The first peak is called the left shoulder, and the third peak is called the right shoulder. Both the left and right shoulders must be lower than the head, but the two shoulders do not have to be the same height."

-- Kirkpatrick and Dahlquist
CMT Level I Curriculum (2023) Chapter 8
Learning Objective: Identify rounding chart patterns such as head-and-shoulders

D. head and shoulders top

Knowledge Domain: Confirmation

12. The basis of On-Balance-Volume (OBV) is the belief that

A. price precedes volume.
B. volume precedes price.
C. volume matters most during breakouts.
D. volume and price are typically coincident indicators.

> "How can the OBV be used in prices that are in a consolidation pattern or trading range rather than trending? When prices are in a trading range and the OBV breaks its own support or resistance, the break often indicates the direction in which the price breakout will occur. Therefore, it gives an early warning of breakout direction from a price pattern."
>
> -- Kirkpatrick and Dahlquist
> CMT Level I Curriculum (2023) Chapter 13
> Learning Objective: List the major indexes and oscillators designed to use volume as confirmation

B. volume precedes price.

13. The stochastics indicator measures

A. where today's typical price fits into the recent trading range.
B. the distance in percentage between the first and last values over n-days.
C. the relative position of the closing price within a past high-low range.
D. the relative strength of the current price movement as it increases from 0 to 100.

> "The stochastic ... looks at the most recent close price as a percentage of the price range (high to low) over a specified past "window" of time. This makes it sensitive to recent action."
>
> -- Kirkpatrick and Dahlquist
> CMT Level I Curriculum (2023) Chapter 13
> Learning Objective: Identify characteristics and applications of indexes and oscillators such as MACD, RSI, and stochastics

C. the relative position of the closing price within a past high-low range.

Knowledge Domain: Selection and Decision

14. A rising relative strength line for a stock in a falling market indicates that

A. price and volume are diverging.
B. the stock is performing worse than the market.
C. the stock is performing better than the market.
D. it may be moving into an overbought state.

"By using ranks that measure relative strength, the co-movement of stocks is filtered out."

-- Levy

CMT Level I Curriculum (2023) Chapter 44

Learning Objective: Explain the value of relative strength in analyzing stock price movements

C. the stock is performing better than the market.

Knowledge Domain: Systems Testing

15. Objective technical analysis methods

A. normally witness less drawdown.
B. normally witness high drawdown.
C. require a disciplined approach for success.
D. are well-defined procedures that issue unambiguous signals.

"In contrast, objective methods are clearly defined. When an objective analysis method is applied to market data, its signals or predictions are unambiguous. This makes it possible to simulate the method on historical data and determine its precise level of performance. This is called back testing. The back testing of an objective method is, therefore, a repeatable experiment which allows claims of profitability to be tested and possibly refuted with statistical evidence. This makes it possible to find out which objective methods are effective and which are not."

-- Aronson
CMT Level I Curriculum (2023) Chapter 41
Learning Objective: Describe objective and subjective methods in technical analysis

D. are well-defined procedures that issue unambiguous signals.