THE REPEATING STORY OF ON BALANCE VOLUME
On February 14, 1876, Alexander Graham Bell and Elisha Gray filed competing claims for a patent on a telephone. Because Bell’s application was officially recorded a few hours before Gray’s caveat, the United States Patent Office awarded Bell the first patent for a telephone. Ensuing litigation showed that Bell and Gray, working independently, had invented the workings of a telephone.

The invention of the On Balance Volume ("OBV") indicator likewise is not unique to one person. In April 1932, Paul Clay, a prominent Wall Street investment counselor, described "a psycho-technical index" that included OBV as the first of five components. In 1951, Frank Vignola and his wife Maude Vignola Woods, who published an investment advisory in San Francisco, California, designed a trading system that used cumulative OBV. In 1948, Edward B. Gotthelf, a commodities trader who later held mercantile seats in New York and Chicago, was using a tabulation method he called OBV. Joseph E. Granville, with whom OBV is popularly associated, claims its realization came to him in August 1961.

The Expression

The term “on balance” means the net effect or result after considering or offsetting all relevant factors. The expression has a long history to describe the state of trade.

On May 24, 1893, The New York Times reported that loans due had been paid and, in recent days, the Bank of England “has received £466,000 of foreign gold on balance.”¹ On October 18, 1908, The New York Times reported that
“another liquidating movement in American securities” had forced London to sell “on balance” not less than 25,000 shares.

The term is used in commodities trading. In June 1922, it was reported that “several houses with Southern connections sold [cotton] on balance.”

Technicians use the term OBV to describe the cumulative result, over a chosen time period, of adding all daily trading volume on days when a security’s price or market index rises and subtracting all the volume on days when they decline.

**The Calculation**

Daily OBV “is calculated by adding the day’s volume to a cumulative total when the security’s price closes up, and subtracting the day’s volume when the security’s price closes down.” All the volume is assigned to correspond to the direction of the day’s close. If price does not change from the prior day’s close, yesterday’s total OBV is recorded. The cumulative count can begin at a baseline index in order to avoid negative numbers.

**The Theory**

*It is not price action, but volume - the amount of money, the supply and the demand - which best tells the story.*

Humphrey B. Neill (1931)

Every price change is the result of a sale or purchase of shares of stock. The number of shares involved in a transaction constitutes volume.

OBV is a momentum indicator that relates volume to the direction of price. Its basic assumption is that volume precedes price, or as Granville posited in 1963, “volume often has a distinct tendency to precede price.” The assumption
is grounded on the dynamic shifts of supply and demand for a security.

Writing in 1935, Harold M. Gartley, arguably the Era’s finest market technician, suggested why we study volume: “Theoretically, the reason we study volume is because it is believed that it is a measure of supply of and demand for shares.” (italics in original) A shift in the supply or demand for a stock will change the stock’s volume. In 1984, Granville wrote that:

“Price will rise only after the volume equation is thrown out of balance by quietly increased demand. Conversely, when heavier, silent selling occurs, supply will overcome demand, and only then will price fall. In either case the alteration in supply and demand must take place before the move in price.”

Frank Vignola and wife Maude Vignola Woods, who in 1951 asserted that buying and selling volume are best analyzed when measured cumulatively, explained their Continuous Volume Curve, as they called OBV, as follows:

“The CONTINUOUS VOLUME CURVE is…. [e]xtremely sensitive to price movement, and will indicate the relative balance between buying and selling at the peaks and valleys of market trends.”

The assumption that volume often precedes price was expressed in 1934. The Wetsel Market Bureau, Inc. (“Wetsel”) was a subscription market advisory service (Humphrey B. Neill was its Vice-President in 1931). In 1934, Wetsel published a 26-lesson trading course. The discussion of “volume and price’s” relationship in Lesson 20 stated that volume “tends to ‘lead’ the price movement and it is in this respect that volume may constitute a forecaster.”

Neill (1895 - 1977) wrote in 1931 “that volume will give you indications of pending moves, often when nothing else will.” Thirty-two years later, Granville
wrote “that on-balance volume can be a particularly effective ‘early warning’ of future price movements.”\textsuperscript{12}

According to Wetsel, "We have seen individual occasions when price would hardly tell you anything about probable future price movement and where volume alone would contribute possibly as much as 85% or 90% to the importance of price and volume combined as indicators."\textsuperscript{13} Long ago, technicians recognized that "volume often precedes price" is a valid working assumption.

\textbf{PAUL CLAY - 1932}

On Tuesday evening, April 26, 1932, the American Statistical Association ("ASA") held a dinner meeting in the Hotel Governor Clinton in Manhattan. The organization of statisticians, the ASA is the second oldest professional affiliation in the United States having been founded in 1839.

The topic for discussion was “Forecasting Methods Successfully Used
Since 1928.” Four speakers were invited.

The second speaker was Paul Clay, whom the minutes recorded as being an investment counselor. The final presenter was James F. Hughes, who had worked alongside of Leonard P. Ayres (ASA’s President in 1926) to create the Advance-Decline Line.

Addressing the audience of 233 guests:

“Mr. Clay stated that he now felt that, in the past, he had underestimated the importance of the New York Stock Market itself in the industrial and financial affairs of the United States, and even of the world…. The movements of the stock market represent the net result of the industry of the United States and a considerable proportion of the rest of the civilized world. Because of this conclusion, Mr. Clay had been led to construct a new index similar, in general, to the Dow theory, but not based upon the Dow methods. This index number he calls a psycho-technical index. It contains five principal elements:

1. A volume index number made by giving the sign of the price movement to the daily volumes, and accumulating the plus and minus movements….

The psycho-technical index built out of these five elements looks much like a price chart with the false movements eliminated. It has the very distinct merit of often moving contrary to the course of the market itself. This index is not used independently, but rather in conjunction with the economic indexes which formerly constituted the chief reliance of Mr. Clay.”

Clay used OBV as one element of an index rather than as an independent indicator. In spite of intense research, additional information about Clay’s index has not been found.
Clay was a prominent economist, statistician, and investment counselor in the years prior to 1945. From 1912/1913 to 1927, he worked at Moody's Investors' Services as an economist and statistician, rising to Vice President and Chief Economist. In 1915, he wrote a 371-page book entitled *Sound Investing*. Moody's published a revised edition in 1920. In 1916, Clay penned an article for Moody's Magazine - *How and When to Buy and Sell* - in which he proffered detailed rules for analyzing "accumulation" and "distribution" as the "really important subject of this article is the *when*." (emphasis in original)

From August 1919, to May 1922, he was Staff Economist and columnist for *Forbes Magazine*. In November 1920, *Forbes* published Clay's column which it "regards … as one of the most important articles it has ever published."

In 1927, Clay was retained as an expert witness on the valuation of stock by a group of founding Ford Motor Company shareholders who were contesting a $30 million income tax assessment on a stock sale. Clay spent February 7, 1927, giving "extremely technical" testimony under forceful cross-examination. The shareholders' group won.

In the Thirties, Clay was an economist for the United States Shares Corporation and Supervised Shares Corporation, investment counsel and trust companies, and in his consultancy Clay's Economic Service. In August 1931, he was elected director and economic adviser of the General Shares Corporation. In October 1934, he became Editor of Brookmire Bulletins, published by Brookmire Economic Service, a national business forecasting firm established in 1910.

Clay was among the first 605 applicants approved by the Securities and
Exchange Commission as registered investment advisers under the Investment Advisers Act of 1940 in New York, New Jersey, and Connecticut. In this group were renowned technicians Ralph Nelson Elliott, William D. Gann, and Harold M. Gartley.

On April 17, 1925, Clay spoke at an ASA meeting on a panel announced days earlier:

**Statistical Dinner on April 17.**

Speakers at the dinner of the American Statistical Association to be held at the Aldine Club on April 17 include William Peter Hamilton, editor of The Wall Street Journal; Roger W. Babson, Ray Vance, President of the Brookmire Economic Service; Paul Clay, economist of Moody’s Investors’ Service, and Frederick R. Macaulay of the National Bureau of Economic Research.

![Figure 2](The New York Times April 12, 1925)

The 1925 and 1932 ASA meetings reveal what motivated Clay's interest in OBV.


“My first ten years on Wall Street, during the 1920’s, were spent working at Moody’s, primarily for Paul Clay, a brilliant economist and market forecaster.

Much as I respected Clay, much as I admired some of his work, especially his long-term forecasts, it became increasingly evident to me that he was missing something.

He concentrated primarily on forecasting business and monetary
conditions, and he was good at both, probably the best around. Then he would transmute his findings into stock market views. His long-term forecasts of stock market trends were excellent, his intermediate-term forecasts fair, but his short-term views left much to be desired.

I recognized that economic and monetary forecasts and trends were vital in projecting stock prices three and four years out, but came to the realization that they could have little value when trying to forecast stock prices over a period of weeks, several months, or even as many as two years.

Then, as the roaring twenties passed into history, the pace of the market increased markedly, lending emphasis to my thoughts. (emphasis in original)."21

Gould recognized that technical indicators worked well in the short and intermediate terms. By 1932, Clay was moving to that view which favored technical analysis over studying business statistics.

At the 1932 ASA meeting, Clay conceded that the “rules which he believed to be dependable,” based on his “years of research concerning the cyclical movements of prices,” had all between 1928 and 1931 “broke down.”22 He concluded “that this breakdown was caused by the fact that the rules were applicable to some eras but not to others.”23 Clay realized that his former rules had broken down following the Great Crash of 1929, but the fermenting vigor of technical studies was opening new frontiers.

Volume, in the early Thirties, became a fertile field for analysis. The increasing volume of stock trading up through 1929 made volume worthy of study.
Clay, ardent economist and business statistician, saw value in technical concepts such as OBV. By 1932, he had changed some of his strong views expressed at the meeting held in April 1925, where he had remarked he “rejected” using an “automatic barometer” or “combining certain barometrical returns, [to] obtain a barometer or index number which is supposed to move ahead of the stock market and indicate its course.”

Clay’s analytical work, grounded in business statistics, was shaped by the 1929 Crash as well as by the post-Crash Emergent Age of technical analysis. The “psycho-technical index” showed his interest in technical analysis and crowd psychology. Clay was thinking technically.

Although little is known about Clay’s index, his formulation of a cumulative volume indicator impresses when one considers the then prevailing demands of studying volume. Harold M. Gartley (1899 - 1972) described them in 1932.

Barron’s announced that “from source material supplied by one of the best-equipped laboratories in Wall Street, the articles will present the most modern work on the interpretation of security-price movements.” In November 1932, Barron’s featured Gartley’s landmark article *The Significance of Volume of Trading*.

Gartley wrote that the accuracy and completeness of volume data were problematic. Analysts faced “the inability to obtain essential data without an almost prohibitive amount of abstraction from the official sheets which list all of the transactions on the Stock Exchange, and compilation,” as well as that in “the past few years, notably from 1928 to date, the number of shares connected with every trade has not appeared on the tape.” The NYSE data neither included nor accurately reported all the volume.
He noted the “serious mechanical problem in the study of total volume because the New York Stock Exchange ("NYSE") publishes volume at unequal intervals: 10:30 a.m., [12:10] p.m., 1:30 p.m., 2:10 [p.m.], and 3:00 p.m.”

Traders had to track five daily tallies of volume. The laboriousness of the task was highlighted by the fact that in 1932 there were 820 companies listed on the NYSE. Moreover, analysts had to compensate for the shorter two-hour trading sessions on Saturdays.

Analysts were debating “the fine question as to whether or not volume should be plotted on arithmetic scale or logarithmic scale,” although the former was used in the majority of studies.

Overlaying these challenges was the corrosive “force of manipulation” that caused unusually large fluctuations in volume which tended to confuse the analysis. The Securities and Exchange Commission had not yet been created.

And, of course, technicians were studying increasing sets of statistics with the limited automation of Burroughs adding machines and punched cards.
THE WETSEL MARKET BUREAU COURSE (Arnold W. Wetsel, 1888 - 1957)

Market historian James Edgar Alphier (1947 - 1990) wrote that he had a copy of a 1934 course which “use[s] the concept” of OBV. He did not further describe the course or amplify the comment.

Alphier was likely referencing Wetsel’s 1934 trading course. Alphier lived within driving distance of the bookstore in Los Angeles, California, owned by the late Donald Mack, who sold and republished technical analysis books, including many out of print. Mack republished Wetsel’s course. Alphier likely obtained a copy of Wetsel’s course from Mack.

Wetsel’s course does not contain a calculation similar to that of OBV, but it
explains how volume tends to lead price, OBV’s basic assumption. Alphier was likely referring to the explanation of this conceptual assumption rather than to an explicit OBV calculation that is not evident in Wetsel’s course.

**FRANK VIGNOLA AND MAUDE VIGNOLA WOODS - 1951**

Larry Williams has suggested that “the idea [of OBV] was originally called *cumulative volume* and was presented in a course written by Woods and Vignolia [sic] in San Francisco in 1946. (emphasis in original)”\(^3\) Until now the evidence was lacking.

They were Francis (Frank) Vignola (1892 - 1961) and his wife Maud (Maude) Vignola Woods (1895 - 1983), who published an advisory letter in San Francisco. Frank’s career was in the photo engraving industry in management and sales. Later, he became an investment counselor. Maude managed their advisory business. Over two decades, under the name M. V. WOODS MARKET ANALYSIS AND RESEARCH, they produced an exceptional body of work that included OBV. They described OBV at least ten years before Granville.

In the mid-Thirties, they began studying the stock market. In June 1940, using the pseudonym “M. V. Woods,” Frank copyrighted their earliest advisory letter named the *Price Curve Plan of Stock Market Trading*.

In 1946, M. V. Woods advertised a report entitled *The Price Curve Plan and Stock Selector with Volume Control* and provided a “PROFIT and LOSS SUMMARY from 1938 to date.” This report is unavailable so it is unknown if it described what Williams calls “cumulative volume.”
But in 1951, M. V. WOODS MARKET ANALYSIS AND RESEARCH published a report (authored and copyrighted by Frank Vignola) entitled *The Price-Curve Plan of Stock Market Trading with Countertrend Signal Analysis*. Vignola wrote that:

“Volume is the pressure gauge for measuring the balance between supply and demand, and for determining the quality of buying and selling in a stock or market Average…. VOLUME CAN BE ANALYZED TO BETTER ADVANTAGE when data is arranged in a time series or on a cumulative basis.” (emphasis in original)

Vignola used three series to analyze volume which he integrated with a 10-day moving aggregate of daily price changes in stocks or market indices called the “Price-Curve.” The first series was a 10-day moving total of aggregate volume called the “Aggregate Volume Curve.” Saturday’s volume was doubled to account for the short session. The second was a 30-day moving total of aggregate volume named the “Major Volume Curve.” These are time based series, but Vignola’s third series differentiated between buying and selling volume.
The third series was the “Continuous Volume Curve” which “is made by adding the total daily market volume of trading to a base index figure, each day the market advances; and by subtracting the volume on days when the market declines.”\textsuperscript{35} Saturday’s volume was not doubled in this series. Vignola suggested a base number of at least 50 or 100 million. He did not use the term “cumulative volume.”

According to Vignola, this curve:

“Is an auxiliary timing device used in connection with other technical condition indices. It is extremely sensitive to price movement, and will indicate the relative balance between buying and selling at the peaks and valleys of market trends. MINOR FLUCTUATIONS OF THE CONTINUOUS VOLUME CURVE follow the daily trend of the Industrial Average, and it is often difficult to distinguish the difference between them. This does not hold true with intermediate and major trends. The main price trend will often precede or lag volume action. The Continuous Volume Curve is a key to the supply and demand equation. Interpretation of this curve is based on a knowledge of divergence, and the breaking of established trend-lines and previously established points of trend reversal.” (emphasis in original)\textsuperscript{36}

Vignola determined an up or down day by the number of issues advancing or declining each day, which he believed to be preferable because they represent the action of the entire market, not the price trend of a few stocks. However, he recommended that if “the number of issues traded [is] not available, use the closing price of the Dow-Jones Industrial Average.”\textsuperscript{37} Vignola’s daily OBV was based on the direction of price or the DJIA, but he maintained a weekly
Continuous Volume Curve based on weekly advances and declines.

Chart 1 shows the Dow Jones Industrials, a Continuous Volume Curve, and several trend lines. For simplicity, he omitted the last three digits of volume.

CHART 1 Continuous Volume Curve, April - August 1949

According to Vignola, the Continuous Volume Curve confirms an indication of strength (weakness) in a Price-Curve and an Aggregate Volume Curve. The Continuous Volume Curve gives a buy (sell) signal when it breaks above (below) one of its intermediate or major trend lines confirming the strength or weakness shown in the other two curves. All three curves have to trend in unison for a buy or sell signal to be given.
Although each of the three volume curves “can be employed separately as trend indicators,” Vignola favored their collective use because all “furnish valuable advance information regarding the future course of intermediate and major price trends.”

Chart 2 shows the Dow Jones Industrials, 10-day Price-Curve, 10-day Aggregate Volume Curve, and Continuous Volume Curve in low volume conditions which Vignola claimed prevail in over 80% of all intermediate and major signals. Note how trend line breaks triggered buy signals.

Chart 2 Vignola’s Price and Volume Series, April - July 1949
M. V. Woods published another course in 1955, but it did not further amplify how to use continuous volume curves.

**EDWARD B. GOTTHELF - 1948**

Edward B. Gotthelf (1908 - 1985) was an upstairs commodities trader from 1935 through 1945. In 1950, he became a member of the New York Mercantile Exchange and Chicago Mercantile Exchange. Later he acquired the basic COMMODEX® system, “one of the first futures trading systems when it was inaugurated in the 1950s.” Edward Gotthelf’s “notes reveal the development of this term as far back as 1948.”

According to Philip, his father “developed a relatively simple method of measuring accumulation,” which Edward Gotthelf called “the On-Balance Volume and Open Interest Method.” Edward Gotthelf’s “notes reveal the development of this term as far back as 1948.”

Gotthelf assigned a “+” to the price for the day when price closed above the previous day’s level. If volume increased on the same day, the volume component received a “+.” A rise in open interest from the previous day was assigned a “+.” However, if price moved up, and volume moved down, the day’s volume was assigned a “-.” When price and volume moved down, volume was assigned a “+.”
Figure 6 recreates a worksheet.

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<th>Date</th>
<th>Price</th>
<th>Volume</th>
<th>Open Interest</th>
<th>Value</th>
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↑ = Up  ↓ = Down

**Figure 6** Gotthelf’s On-Balance Volume and Open Interest Method

Over time, the net plus and minus days would be counted. If on balance, net pluses outnumbered net minuses, Gotthelf would be a buyer. If minuses exceeded pluses, he would sell. If net pluses and minuses were about even, he would stay neutral. Trading tactics were developed based on observations of the on balance plus and minus series.

Gotthelf believed his OBV method detected accumulation (open interest and volume rise) and distribution (the reverse) which led to overbought or oversold markets. Overextended markets, notably those following a long period of accumulation, could experience dramatic corrections which in turn gave buy and sell signals.

Gotthelf’s method is more akin to a tabular score than to a cumulative count, but it shows that the term OBV was used in futures trading more than fifteen years before Granville wrote his OBV book in 1963.

**CONCLUSION**

Several people working in different decades and living thousands of miles
from each other conceived OBV - a remarkable and not uncommon story of creativity. Recognition for OBV’s invention must be shared.

Alphier opined, “I’m confident Granville came upon OBV independently, but I have two courses in my library, one written in 1955 [Vignola] and one in 1934 [likely Wetsel], which use the concept. I also can be confident that Granville’s two predecessors didn’t have any contact with each other….“45 Until proven otherwise, the same must be said of Clay, the Vignolas, and Gotthelf.

We cannot shadow their brilliance, but these conclusions should not surprise. The indicator’s simplicity and its sensible logic explain why several people (and these are the ones we know) developed OBV from their own studies.

While Granville popularized OBV, Paul Clay and clearly, Frank Vignola and Maude Vignola Woods, had earlier originated OBV, while Edward B. Gotthelf used the term. Volume was uniquely important to the analytical work of Granville’s predecessors. They believed volume could presage the direction of price, and a cumulative count was a valid way to analyze buying and selling volume. All were intelligent observers of volume in stock and futures markets who merit recognition.

ENDNOTES

1 N. Y. TIMES, May 24, 1893, On the London Exchange (all NYT citations are to the digital archives).

2 N. Y. TIMES, Oct. 18, 1908, Financial Markets.

3 N. Y. TIMES, June 30, 1922, Cotton Men Await Condition Estimate.


8 Granville, 1984, 91.


11 Neill, 1931, 169.

12 Granville, 1963, 55.

13 Wetsel, 1934, 97.

14 Figures 1 and 3 are from Google Images.
15 King, Willford I., 1932, *Forecasting Methods Successfully Used Since 1928*, *Journal of the American Statistical Association*, vol. 27, 179: 317. The other elements were the price movements of the twenty stocks having the largest daily volume, adding 1 to the index on up days and subtracting 1 on down days, “resistance ratios” to measure liquidation and short sales, and relative strength.


20 *N. Y. Times*, Nov. 2, 1940, *SEC Lists Advisers In Investing Field*.


22 King, 1932, 316 - 17.

23 *Id.*, 317.


27 *Id.*

28 NYSE archives (http://tinyurl.com/84pmyfm).
29 Gartley, 1932, 22.

30 Library of Congress.


34 Vignola, 1951, Study 2-B: 1.

35 Id., Study 3-B:1.

36 Id.

37 Id., Study 3-B:2.

38 Id., 3-B:3.

39 Id., Study 1-C: 1.

40 Id., 1-C:3.


42 Id.

43 Id.

44 Id.

45 Alphier, 1988, 396.