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Are Symmetrical Patterns More Successful?

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"Beauty is in the eye of the beholder".

The human eye naturally gravitates toward symmetry, and can more easily recognize a symmetrical pattern than an assymetrical one.

When applying technical analysis[i] to the stock market, pattern definition and recognition is a key tool. Until recently, much of technical analysis has relied on the eye of the beholder. Chart analysis and pattern identification have usually been performed manually, and involve scanning thousands of charts. Every technical analyst has their own technique for spotting patterns, their own unique definition of whether a "pattern is a pattern", and their own assessment of the risk associated with trading a particular pattern. As a result, many people describe pattern recognition as an art rather than a science.

Recognia has developed sophisticated pattern recognition software that uses quantitative characteristics associated with the patterns that appear in stock market charts, to allow each pattern to be identified easily. Researchers and clients then can select particular patterns for analysis, together with the characteristics of those patterns that most interest them.

A great deal of discussion has occurred on the subject of symmetry and its usefulness in rating patterns. Symmetry is one of the quantitative characteristics that most easily identifies a pattern. The more symmetrical a pattern is, the easier it is to identify. Debate has raged, however, on whether symmetrical, well-formed patterns have a higher success ratio (i.e., are they more likely to perform as anticipated) than those that are less symmetrical, less well-formed, and therefore less easily identified as patterns.

Many analysts believe that, while symmetrical patterns may be more intrinsically pleasing, they do not necessarily perform any better than less symmetrical patterns. Is there a way to prove or disprove this hypothesis?

After assembling a very large database of historical patterns, Recognia statisticians are now studying them to determine whether a correlation does exist between the degree of symmetry of a pattern and its performance. To test our case, we need to agree on a definition of symmetry, and then provide measures to quantify it.

What is Symmetry?

The Merriam-Webster Collegiate Dictionary defines symmetry as:

> **1 :** balanced proportions; *also* **:** beauty of form arising from balanced proportions
> **2 :** the property of being symmetrical; *especially* **:** correspondence in size, shape, and relative position of parts on opposite sides of a dividing line or median plane or about a centre or axis

Many of the patterns used in technical analysis are symmetrical in the abstract definition. Writing about the Head and Shoulders pattern, Edward and Magee state:

There is a tendency...for Head-and-Shoulders Patterns to develop a high degree of symmetry. The neckline tends to be horizontal and the right shoulder tends to resemble the left in price confirmation (although not, of course in volume).... But symmetry is not essential to a significant Head-and-Shoulders development.[ii]

In the real world, few patterns have perfect symmetry; but it is possible to look at a pattern and declare it to be highly symmetrical, and to look at another and say that it is not very symmetrical.

Calculating a Pattern's Symmetry Rating

This paper presents a method for defining an objective symmetry rating for a given set of patterns, using known information about the points by which the pattern is defined.

We are interested both in mirror symmetry in patterns (the relative position of points on opposite sides of a dividing line), and the balance of the pattern as a whole. It would be useful to define a relative measure of symmetry such that, a pattern with a higher symmetry rating will be clearly more symmetrical than a pattern with a lower symmetry rating. To achieve this we will apply fuzzy logic[iii] to the problem, because it is well suited for measurements described in terms such as "highly symmetrical" or "not very symmetrical".

In a perfectly symmetrical pattern, a measure taken on one side of the dividing line will be identical to the corresponding measure taken on the other side of the line. All points are in balance. In cases where this is not so (the norm), we use a *proportional measurement function*, which provides a number that indicates how close the relevant measurements are to being proportional.

The proportional measurement function, P, is the ratio between the value of the smallest of a set of measurements taken to the largest of the measurements taken:

$$P(M_1,M_2\ldots M_n) = \text{Min}(M_1,M_2\ldots M_n)/\text{Max}(M_1,M_2\ldots M_n)$$

Where:

P	the proportional measurement function	n	the number of measurements taken
M	a measurement		

P always has a value between 0 and 1 (all measurements are taken in a manner to assure that all measurement values are positive values).

A value, t, is defined as the minimal acceptable threshold of the proportional measurement function for the measurement in question. In the general case, the value of t is .5, because if one measurement is more than twice as large as the other, the measurements are not considered to be proportional. It is possible, however, for different measurements to have different minimal acceptable thresholds, and thus to have different values of t. In all cases, the value of t is greater than or equal to 0, and less than or equal to 1 ($0 <= t <= 1$).

The symmetry rating is calculated as follows. If the value of P for a given set of measurements is less than a minimum threshold value, t, the symmetry rating (S) is 0. Otherwise, the value of S equals the value of the proportional measurement function (P) minus the threshold (t), divided by one minus the threshold:

$$S(M_1,M_2\ldots M_n) = \begin{cases} 0 & \text{if } P(M_1,M_2\ldots M_n) < t \\ (P(M_1,M_2\ldots M_n)-t)/(1-t) & \text{if } P(M_1,M_2\ldots M_n) >= t \end{cases}$$

Where:

S	symmetry rating	n	number of measurements

taken

P	proportional measurement function	t	the minimum acceptable threshold of the proportion function
M	a measurement		

Let's take the case of mirror symmetry. We draw a dividing line down the presumed centre of the pattern, and M_1,M_2 are measurements taken from opposite sides of the dividing line. Here, the value of n is 2.

In other types of symmetry, n > 1, and M_1,M_2...M_n are measurements that are expected to be identical, if the pattern is ideally symmetrical.

Overall Symmetry Rating

Given n sets of measures, to obtain the overall symmetry rating for a pattern, calculate the intersection of all the symmetry ratings for the individual measurement sets. In fuzzy logic, the overall symmetry rating for a given pattern is the minimum symmetry of the defined points for that pattern:

S_1 AND S_2 AND S_3 ... AND S_n = Min(S_1, S_2, S_3, ... , S_n)

A Specific Case: Head-and-Shoulders Top Patterns

Figure 2

A Head-and-Shoulders Top pattern (see the example in Figure 2) is obviously very symmetrical, and has a high symmetry value of .98.

The pattern forms after an uptrend, and its completion marks a trend reversal. The pattern contains three successive peaks, with the middle peak (head) being the highest and the two outside peaks (shoulders) being low and roughly equal. The reaction lows of each peak can be connected to form a support line or a neckline. **Error! Reference source not found.** provides a schematic representation of this pattern.

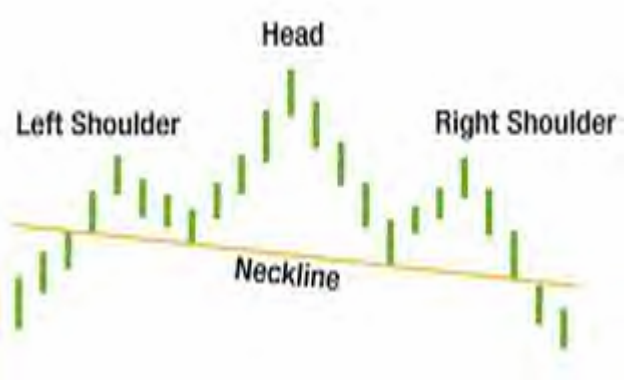


Figure 3

The following are the measurement pairs that are used in the Head-and-Shoulders symmetry rating, along with the minimum threshold for each pair:

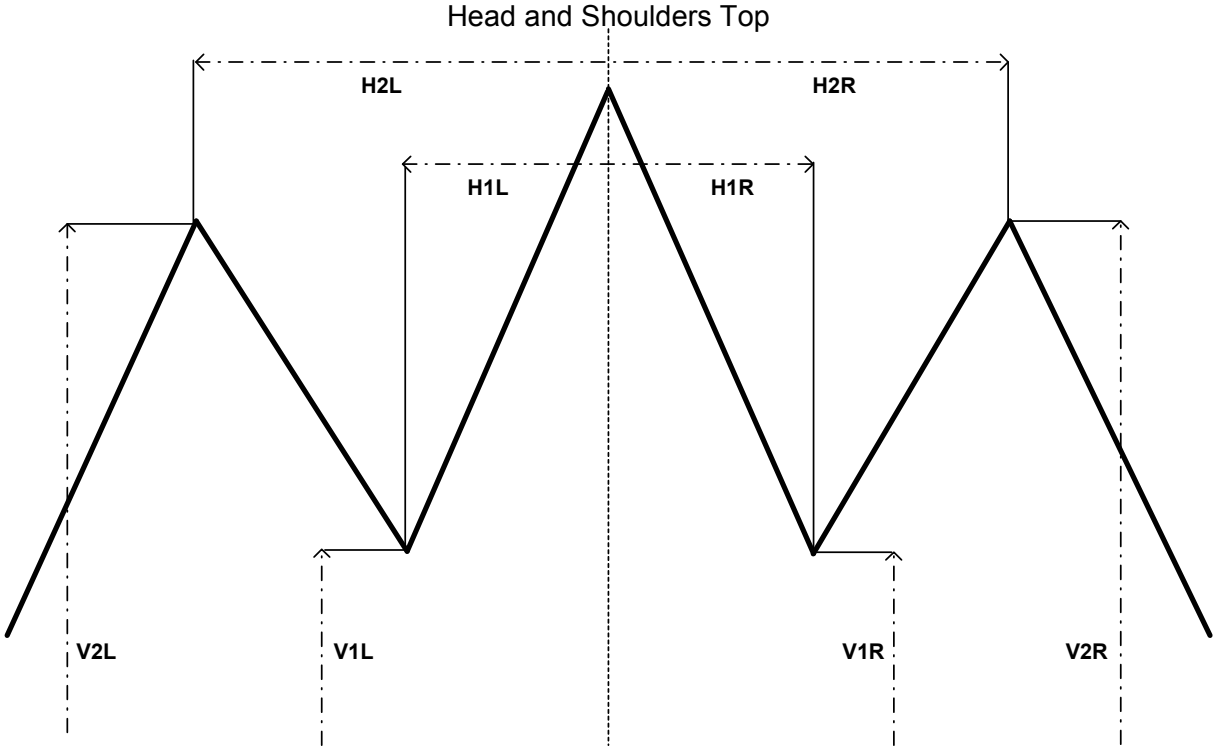
H1L, H1R
H2L, H2R
t = .5

V1L, V1R
V2L, V2R
t = .8

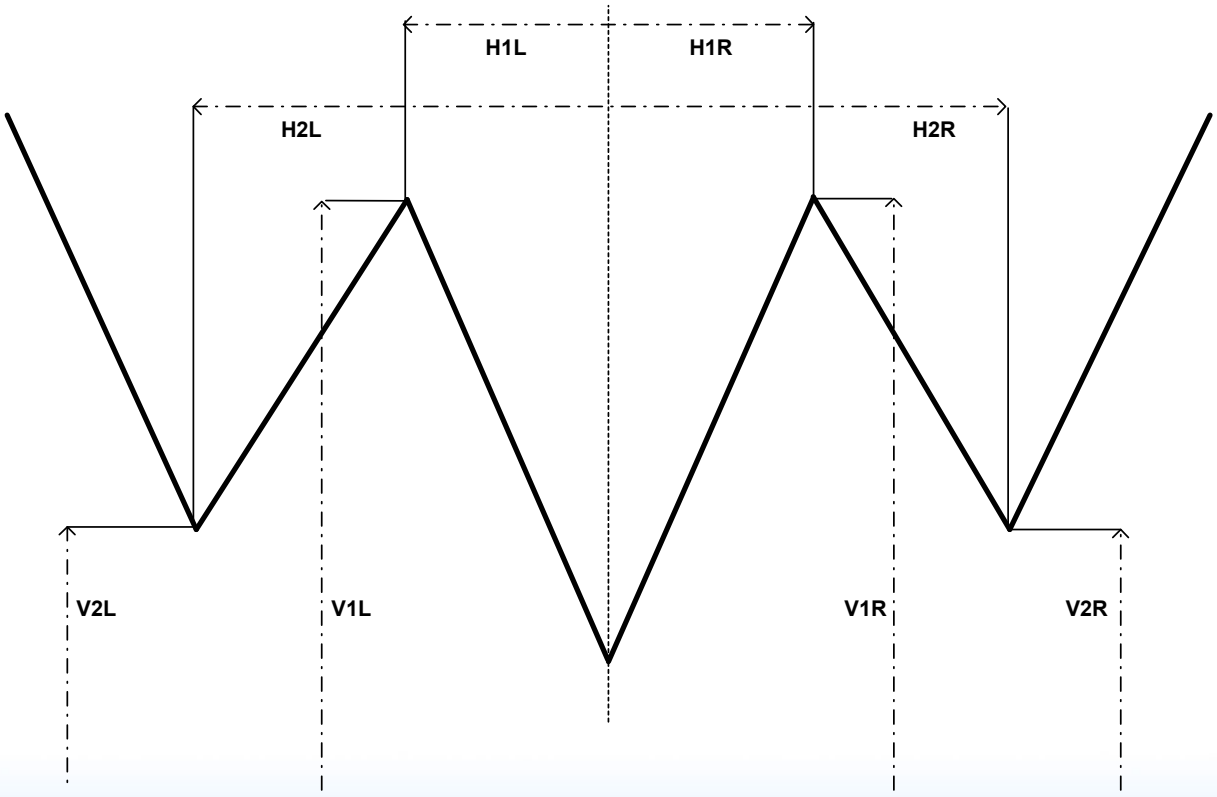
The horizontal measures are measures of time, and have more relaxed thresholds than the vertical measures, which are price measures.

The schematic representations of Figures 2 and 3 are obviously very symmetrical, and have an ideal symmetry value of exactly 1.

Head and Shoulders Top



Head and Shoulders Bottom



What

About Recognia

Recognia is the industry leader providing actionable investment research products for on-line brokers. Our compelling product suite uses automated interpretation of technical, fundamental and value based analytics to increase account-holder activity and boost trader confidence.

Recognia helps to automate the investment decision making process by offering dynamic and action-oriented trading ideas for all trader types, in order to execute timely trade transactions with confidence.

Recognia provides coverage of more than 50 exchanges worldwide, including stocks, equities, forex, indices, currencies and futures.

Founded in 2000, in Canada's National Capital region of Ottawa, Recognia today has more than 20 million provisioned accounts worldwide and our products service the largest and most successful on-line brokerage firms and institutions including; Bloomberg, Thomson-Reuters, Saxobank, E-Trade, HSBC, ICICI Direct and Reliance Money to name a few.

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[i] Two distinct schools of thought exist regarding stock market analysis: fundamental analysis and technical analysis. Technical analysis is the study of the action of the market itself, as opposed to the study of the goods in which the market deals (fundamental analysis). Edwards and Magee define Technical Analysis as the science of recording, usually in graphic forms, the actual history of trading in a certain stock or in the "the Averages" and then deducing from that pictured history the probable future trend.
Edwards, Robert D, and John Magee, Technical Analysis of Stock Trends, 7th edition, American Management Association: New York, 1998. p. 3.

[ii] Edwards and Magee, p. 71.

[iii] Fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual true or false (1 or 0) logic on which the modern computer is based. Fuzzy logic includes 0 and 1 as extreme cases of truth, but also includes the various states of truth in between so that, for example, the result of a comparison between two things is not "tall" or "short" but ".38 of tallness". (definition adapted from whatis?com, Internet site).