How Useful is the Sentiment Index?

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How Useful Is the Sentiment Index?

The Bearish Sentiment Index—the ratio of the number of investment advisers who are bearish to the total number of advisers who are either bearish or bullish—is promoted as a contrary indicator. That is, one should buy when investment advisers are bearish and sell when they are bullish. But is the Bearish Sentiment Index useful?

Examination of the data from January 1963 (when the index was first compiled) to September 1985 indicates that the index is useless as an indicator of forthcoming stock price changes. The number of correct forecasts by the index is equaled by the number of incorrect forecasts.

If the Bearish Sentiment Index is useless, why do people continue to use it? The persistence of the belief in the usefulness of the index results from errors in cognition that lead people to see patterns in random data and to neglect evidence that runs counter to their beliefs.

CONTRARY OPINION RULES, including the investment advisory opinion, odd-lot trading, short-selling and mutual fund cash positions, assume that a majority of investors are wrong most of the time, especially at market tops and bottoms. A wise investor is a contrarian, selling when most investors are bullish and buying when they are bearish.

The Bearish Sentiment Index, published by *Investors Intelligence*, is the ratio of the number of bearish advisers to the number of all advisers expressing an opinion. A contrarian use of the sentiment index calls for buying stocks when the index is high and selling when it is low. Use of the index is discussed frequently in the financial press. For example, John Andrew wrote in *The Wall Street Journal*:

> In recent years, the numbers have become one of the most popular contrary indicators in investment circles. On the theory that the stock market generally does the opposite of what most people think it will do, a high percentage of bullish advisers is considered bearish for the market. If most advisers are bears, then the stock market is supposed to be poised for a big rally.[1]

The sentiment index is also discussed in investment textbooks. Cohen, Zinbarg and Zeikel wrote:

> Figure 8-11 shows the correlation between the Bearish Sentiment Index and the Dow Jones Industrial Averages for the 1965–85 period. As the data show, index readings over 55 percent have generally signaled that too many people were bearish and that the market was thus staged for an upturn. Conversely, an index reading of less than 15 percent has suggested too much optimism and has invariably led to a market decline.[2]

Does the evidence support the claim that the index is useful? This article examines the effectiveness of the index and concludes that it is useless as a forecasting tool. The continuing belief in its usefulness is also explored.

The Sentiment Index

Investors Intelligence, an investment service based in Larchmont, New York, compiles and

1. Footnotes appear at end of article.

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publishes data based on a survey of investment advisory newsletters. The sentiment data include the proportion of advisers who are bullish, bearish or expecting a correction. The last category consists of advisers who expect a decline in stock prices in the short term, but an increase in stock prices in the long term. Investment advisory opinions are not always easy to classify as bullish, bearish or corrections, but *Investors Intelligence* attempts to make its classification criteria consistent from week to week by assigning the same people to the classification task.[3]

The report also includes the level of the Dow Jones Industrial Average (DJIA) one week earlier, the date corresponding, approximately, to the publication date of the advisory reports that are the basis for the *Investors Intelligence* data. For example, the Friday, November 23, 1984 *Investors Intelligence* report, based on the opinion of 130 investment advisers, indicated that 56.4 per cent of the advisers were bullish, 23.1 per cent bearish and 20.5 per cent expected a correction. The DJIA as of November 16, one week earlier, was 1187.94. The *Investors Intelligence* report that "last week's reading of 57.6 bulls was the highest since the 9/15/78 mark of 57.8, shortly before the October massacre. This is an obvious danger sign that should not be ignored."

The sentiment data were reported once every month from January 4, 1963 until January 31, 1964. From February 14, 1964 until June 13, 1969, the figures were reported once every two weeks. Since then, the sentiment data have been reported weekly. Our sample period begins on January 4, 1963 and ends on September 20, 1985. It contains a total of 1,000 observations.

Does the Sentiment Index Precede the Market?

The Bearish Sentiment Index is the ratio of the proportion of bearish advisers to the proportion of advisers who are bearish or bullish. The Bearish Sentiment Index ranged between 0.863 and 0.054 in our sample, with a mean of 0.421 and a standard deviation of 0.167.

Are low levels of the Bearish Sentiment Index associated with subsequent declines in stock prices? Our concern was the forecasting ability of investment advisers, hence the relevant reference point for stock price changes would be the price that prevailed when the advisers expressed their opinions. That time is approximately one week preceding the publication of the opinion data by *Investors Intelligence*. Because the forecasting horizon of investment advisers is not always explicit, however, we examined the usefulness of forecasts over three horizons—four weeks, 26 weeks and 52 weeks.

Consider $R_{0,4}$, the change in the DJIA over the period of four weeks, from time 0 to time 4, relative to the level of the DJIA at time 0. The Bearish Sentiment Index at time 0 is the following ratio:

$$\frac{\text{BEARS}_0}{\text{BULLS}_0 + \text{BEARS}_0},$$

where BEARS_0 and BULLS_0 are the proportions of bearish advisers and bullish advisers at time 0.

If the Bearish Sentiment Index is useful as a contrary indicator, we should find that high levels of the index are associated with subsequent increases in the DJIA. In other words, we should find that the slope b is positive in the following equation:

$$R_{0,4} = a + b\frac{\text{BEARS}_0}{\text{BULLS}_0 + \text{BEARS}_0} + u,$$

where "a" is the intercept and "u" is the error term.

Our sample contained 294 nonoverlapping four-week changes in the DJIA, starting in January 1963, and the corresponding Bearish Sentiment Index data. Table I presents the results of the analysis. The data show no significant relation between the Bearish Sentiment Index and changes in the DJIA over the subsequent four weeks. The slope coefficient, b, is −0.004, and does not differ from zero by a statistically significant amount.

To examine the usefulness of the Bearish Sentiment Index for the 26-week forecasting horizon, we divided the sample period into 45 nonoverlapping, 26-week segments beginning in January 1963. As was the case with the four-week period, the data (in Table I) show no relation between the index and subsequent changes in the DJIA. The slope coefficient, −0.038, is not different from zero by a statistically significant amount.

We repeated the analysis with the 26-week nonoverlapping periods constructed so that the first period began in February 1963 (rather than January), as well as in March, April, May and

Table I The Relation between the Bearish Sentiment Index (independent variable) and Percentage Change in the DJIA in Subsequent Four-Week, 26-Week and 52-Week Periods (dependent variable)

Dependent Variable	*Intercept*	*Slope*	*Adjusted R^2*	*Durbin-Watson Statistic*	*Number of Observations*
Percentage Change in the DJIA over the Subsequent Four-Week Period	0.005 (0.72)	−0.004 (−0.32)	0.00	2.05	294
Percentage Change in the DJIA over the Subsequent 26-Week Period	0.030 (0.85)	−0.038 (−0.47)	0.00	1.67	46
Percentage Change in the DJIA over the Subsequent 52-Week Period	−0.000 (−0.00)	0.087 (0.51)	0.00	2.30	23

June. (A sample beginning in July is identical to a sample beginning in January, where the first observation is omitted; similar comments apply to samples beginning in August through December.) The results for the February through June samples were similar to the results for the January samples. Indeed, the coefficients of determination for all the 26-week samples were zero.

Next, we examined the usefulness of the sentiment index under the assumption that advisers attempt to forecast changes in the DJIA over the following year. We divided the sample into 23 nonoverlapping 52-week periods, the first beginning in January 1963. The slope coefficient of 0.087 (Table I) is not statistically significantly different from zero. We again repeated the analysis with the 52-week periods constructed to begin in February 1963, March 1963 and so on through December 1963. The results were similar to those obtained with the January sample. The mean coefficient of correlation in the samples was 0.01.

Extreme Index Values

Analysis of the data suggests that the Bearish Sentiment Index is not useful as a contrary indicator; there is no relation between the index at any point in time and the change in the DJIA in the subsequent period. But perhaps the Bearish Sentiment Index is useful as a contrary indicator only when it takes extreme values. Cohen, Zinbarg and Zeikel, as noted, wrote that index levels higher than 55 have generally signaled subsequent market upturns, while index

Table II The Relationship between the Bearish Sentiment Index and Changes in the DJIA in the Subsequent Four-Week, 26-Week and 52-Week Periods

	4 Weeks	*26 Weeks*	*52 Weeks*
Number of observations where the DJIA increased following Bearish Sentiment Index ratios above 0.55	37	12	11
Number of observations where the DJIA decreased following Bearish Sentiment Index ratios above 0.55	37	9	3
Number of observations where the DJIA increased following Bearish Sentiment Index ratios below 0.15	9	3	1
Number of observations where the DJIA decreased following Bearish Sentiment Index ratios below 0.15	7	2	2
Total number of observations	90	26	17
Chi-square	0.20	0.01	2.44
Level of significance	0.65	0.91	0.12

Table III The Relationship between the Bearish Sentiment Index and Changes in the DJIA in the Subsequent Four-Week, 26-Week and 52-Week Periods (standard deviations in parentheses)

	Four Weeks	*26 Weeks*	*52 Weeks*
Mean percentage change in the DJIA following Bearish Sentiment Index ratios above 0.55	0.0027 (0.052)	0.0237 (0.109)	0.0515 (0.149)
Number of observations	74	21	14
Mean percentage change in the DJIA following Bearish Sentiment Index ratios below 0.15	−0.0014 (0.026)	−0.0162 (0.060)	−0.0175 (0.055)
Number of observations	16	5	3
t-statistic of the difference between means	0.46	1.11	1.36
Level of significance	0.65	0.29	0.21

levels below 15 per cent have invariably led to market declines.

The analysis so far has considered the entire range of the sentiment index—values above 55 per cent and below 15 per cent, as well as values between 55 and 15 per cent. Inasmuch as most observations fall into the last group, it is possible that "noise" contributed by that group obscured the relation between the Bearish Sentiment Index and subsequent changes in the DJIA. We examined the data to see if stock price changes following index levels higher than 55 per cent differed from stock returns following index levels lower than 15.

Consider the relation between index values exceeding 0.55 and changes in the DJIA over the following four weeks. We deleted from this set observations that occurred within four weeks of preceding observations so as to eliminate dependence among observations. There were a total of 74 observations that satisfied these criteria. There were 16 observations where the index fell below 0.15 and where no more than one observation existed for each four-week period.

If the Bearish Sentiment Index is useful as a contrary indicator, we would expect to find that four-week periods with stock price decreases following index observations below 0.15 are relatively frequent. (Recall that low levels of the index indicate that investment advisers are bullish.) Similarly, we would expect to find that four-week periods with stock price increases following index observations above 0.55 are relatively frequent. Table II presents the actual distribution of the observations.

There is no statistically significant relation between the index and changes in the DJIA in the subsequent four-week periods. For example, the DJIA increased following 37 of the 74 index observations exceeding 0.55, but it declined following an identical number of observations. Furthermore, the mean percentage

Table IV The Relationship between the Bearish Sentiment Index (independent variable) and Percentage Change in the DJIA in the Preceding Four-Week, 26-Week and 52-Week Periods (dependent variable)

Dependent Variable	*Intercept*	*Slope*	*Adjusted R^2*	*Durbin-Watson Statistic*	*Number of Observations*
Percentage Change in the DJIA over the Preceding Four-Week Period	0.042 (7.35)*	−0.096 (−7.51)*	0.16	2.01	293
Percentage Change in the DJIA over the Preceding 26-Week Period	0.157 (5.79)*	−0.345 (−5.61)*	0.41	1.79	45
Percentage Change in the DJIA over the Preceding 52-Week Period	0.179 (3.04)*	−0.413 (2.92)*	0.26	2.51	22

*Statistically significant at the 0.01 level.

Table V Probability of Making a Second Free Throw, Conditioned on the Outcome of the First Free Throw (nine members of the Boston Celtics during the 1980–81 and 1981–82 seasons) (number of shots in parentheses)

Player	$P(H_i/M_i)$		$P(H_i/H_i)$		Serial Correlation r
Larry Bird	0.91	(53)	0.88	(285)	−0.032
Cedric Maxwell	0.76	(128)	0.81	(302)	0.061
Robert Parish	0.72	(105)	0.77	(213)	0.056
Nate Archibald	0.82	(76)	0.83	(245)	0.014
Chris Ford	0.77	(22)	0.71	(51)	−0.069
Kevin McHale	0.59	(49)	0.73	(128)	0.130
M. L. Carr	0.81	(26)	0.68	(57)	−0.128
Rick Robey	0.61	(80)	0.59	(91)	−0.019
Gerald Henderson	0.78	(37)	0.76	(101)	−0.022

Source: T. Gilovich, R. Vallone and A. Tversky, "The Hot Hand in Basketball: On the Misperception of Random Sequences," *Cognitive Psychology* 17 (1985), pp. 295–314.

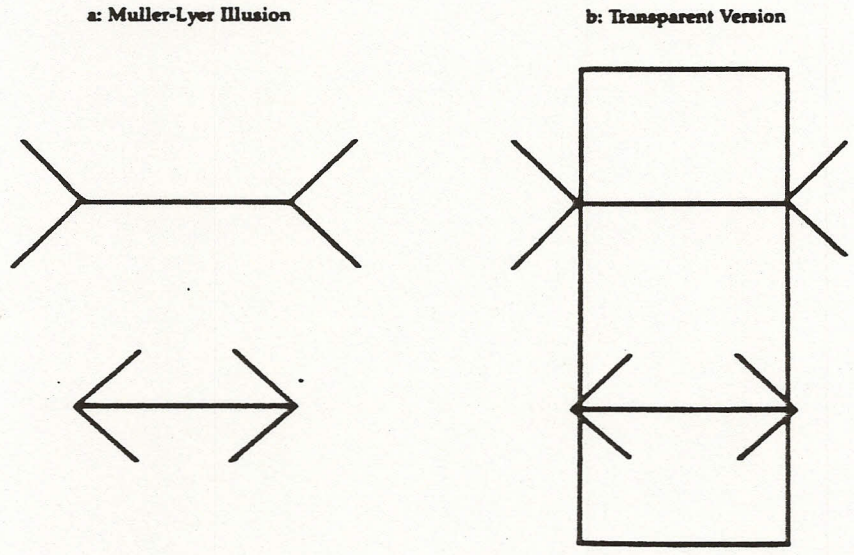
change in the DJIA in the four weeks following index observations exceeding 0.55 is not significantly different from the mean percentage change in the DJIA in the four weeks following index observations that fall below 0.15.

We conducted similar analyses for forecasting horizons of 26 and 52 weeks. The results, shown in Table III, are similar to those for the four-week horizon: There is no statistically significant relation between the index and changes in the DJIA in the following periods. Note, however, that the 26-week and 52-week samples are small.

Does the Sentiment Index Follow the Market?

The rationale underlying the Bearish Sentiment Index was explained by *Investors Intelligence* as

Figure A Effect of Framing



Source: A. Tversky and D. Kahneman, "Rational choice and the framing of decisions," *Journal of Business* 59 (1986), pp. 251–278.

follows: "Since most advisory services are trend followers, they are most bearish at market bottoms, and least bearish at market tops."[4] Similarly, Dreman wrote: "As markets approach their highs, larger and larger numbers of advisers become bullish, and as they move towards their lows, an increasingly expanding herd stampedes for the exits. Are investment advisers trend followers? The answer is yes."[5]

Consider the following equation:

$$R_{-4.0} = a + b\frac{BEARS_0}{BULLS_0 + BEARS_0} + u,$$

where

$\frac{BEARS_0}{BULLS_0 + BEARS_0}$ = the Bearish Sentiment Index at time 0,

$R_{-4.0}$ = the change in the DJIA over the four weeks preceding time 0, relative to the price at the beginning of the four-week period, and

a, b and u = the intercept, slope, and the error term, respectively.

If investment advisers follow a four-week trend, we should find that they become more bearish after a DJIA decline over the preceding four weeks. In other words, we should find that the slope, b, is negative.

The results of our analysis, presented in Table IV, suggest that this is indeed the case. The slope coefficient, −0.096, differs from zero by a statistically significant amount. Furthermore, the results for the 26 and 52-week periods are similar to those for the four-week period.

Why Does Belief in the Index Persist?

If the sentiment index is useless as a predictor of future changes in stock prices, why do people continue to believe that it is useful? We suggest that the persistence of the belief in the usefulness of the index is due to errors in cognition.[6] We focus here on two errors—failure to recognize randomness and illusion of validity.

Patterns and Randomness

A striking failure to recognize randomness is the belief in the "hot hand" in basketball. A player is described as having a "hot hand" when he has had a series of hits. Players, coaches and fans share the belief that a player is more likely to score a hit after a hit than after a miss. But Gilovich, Vallone and Tversky investigated basketball records and concluded that the hot hand is an illusion; a player is no more likely to score a hit after a hit than after a miss.[7] For example, 88 per cent of Larry Bird's second free throws following hits in the first throw were hits; 91 per cent of his second free throws following misses in the first free throw were hits. The difference between the two figures is insignificant (see Table V).

There is a general belief that, while people commit errors, experience leads them to recognize their errors and avoid them in the future. An interesting aspect of the belief in the hot hand, however, is that its strength increases with experience; it is more pronounced among players, coaches and avid fans than among the average fans.

Optical illusions, such as the Muller-Lyer illusion, are examples of errors in cognition. Most people perceive the top horizontal line in Figure Aa as longer than the bottom horizontal line. However, the bottom horizontal line is longer, a fact made apparent when the two lines are enclosed in a rectangle in Figure Ab. Kahneman and Tversky used the Muller-Lyer illusion to illustrate the effect of framing on cognition.[8] The framing in Figure Aa is nontransparent, leading to an error in cognition. That error is eliminated when the framing is made transparent by the imposition of the rectangle in Figure Ab.

Failure to recognize randomness characterizes much of technical analysis. Almost 30 years ago, Roberts showed that the "head-and-shoulders" pattern of stock prices can be generated from a table of random numbers.[9] The head-and-shoulders graph in Figure Ba is a nontransparent presentation of randomness; the graph seems to show a pattern, but in fact a pattern does not exist.

Roberts was interested in more than just convincing his readers that stock market patterns can be generated from a table of random numbers. He wanted to teach his readers how to present data in a transparent frame so as to distinguish randomness from real patterns. Specifically, he demonstrated that, while Figure Ba, depicting "levels" of the DJIA, is a nontransparent frame of the underlying randomness, Figure Bb, depicting "changes" in the DJIA, is a transparent frame and shows the underlying randomness. He also showed how statistical techniques, such as analyses of runs, can be used to distinguish patterns from randomness.

We found that changes in the DJIA during a period are unrelated to the level of the sentiment index at the beginning of the period. In other words, changes in the DJIA, conditional on the sentiment index, are random. We think the failure to recognize randomness as it relates to the index arises from nontransparent framing of the data. The conclusion that the sentiment index can be used to forecast changes in the DJIA is largely based on graphs, such as Figure C, that present the levels of the sentiment index and the levels of the DJIA. There is indeed a relation between the two, but the relation is the sentiment index *following* the DJIA, not *leading* it. As Sharpe has noted, such relationships tend to result in nontransparent frames, where it is easy to confuse the follower with the leader:

> Occasionally the proponent of a system will produce a graph that plots both the levels of an indicator intended to predict future market moves and the levels of the market itself. Visual comparison of the two curves may suggest that the indicator has indeed predicted changes in the market. However, the eye cannot easily differentiate between a situation in which changes in a market predictor *follow* the market and one in which the changes *precede* the market. But the distinction is crucial, for only a situation of the latter type can bring superior investment performance.[10]

Illusions of Validity

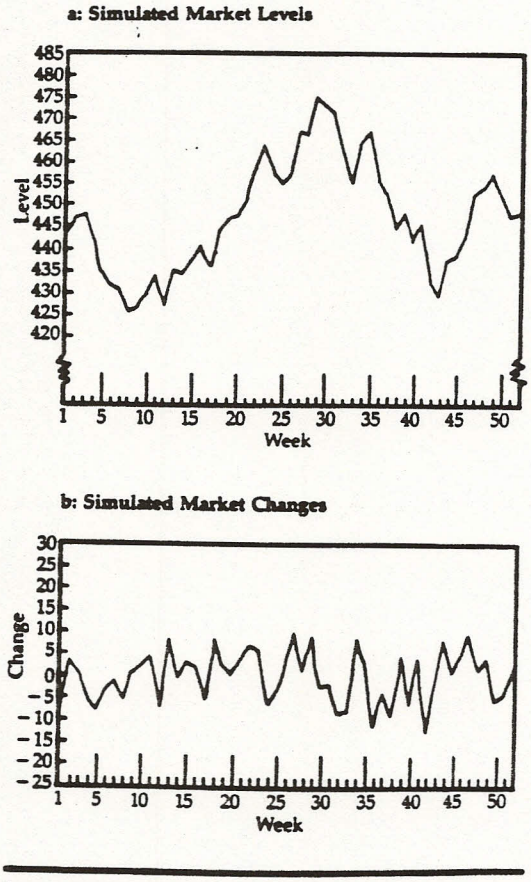
Standard statistical techniques can be used to provide transparent frames, but they are not always used. People generally substitute intuitive judgment for statistical analysis. Kahneman and Tversky wrote:

> People are prone to experience much confidence in highly fallible judgment, a phenomenon that may be termed the *illusion of validity*. Like other perceptual and judgmental errors, the illusion of validity persists even when its illusory character is recognized.[11]

Einhorn and Hogarth have suggested that the illusion of validity persists because people focus on information that confirms their hypotheses and neglect disconfirming information.[12] Consider two experiments by Wason and by Einhorn and Hogarth.

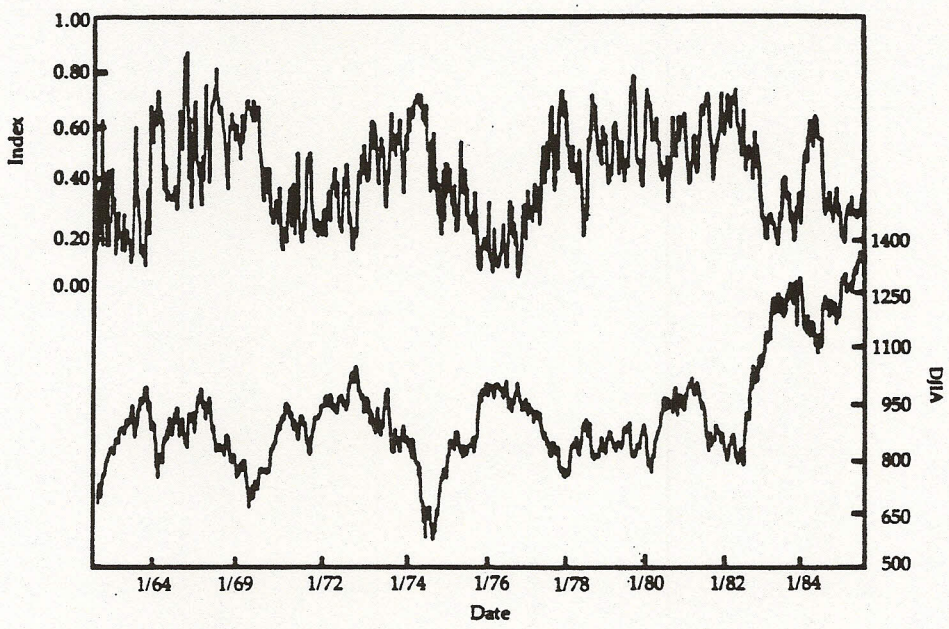
Wason presented subjects with a three-number sequence, such as 2, 4, 6.[13] He asked subjects to discover the rule to which the three numbers conformed. (The rule was three ascending numbers.) Subjects were asked to discover the rule by generating three-number sequences, which the experimenter would classify as conforming or nonconforming. Subjects were allowed to try as many sequences as they wished. As Wason noted, the correct solution to the task requires "a willingness to attempt to falsify hypotheses and thus to test those intuitive ideas which so often carry the feeling of certitude."[14] In this particular case, it is likely that the intuitive rule relates to even numbers. A correct solution, however, would attempt to test intuition by trying a sequence with an odd number. Most subjects in Wason's experiment attempted to discover the rule by generating only sequences of even numbers, sequences that can confirm but never falsify the intuition

Figure B Pattern and Randomness



Source: H.V. Roberts, "Stock-market 'patterns' and financial analysis: Methodological suggestions," *Journal of Finance* 24 (1959), pp. 1–10.

Figure C The Bearish Sentiment Index and the Dow Jones Industrial Average, 1963–1985



about the rule. Only six of 29 subjects found the rule.

The subjects in Wason's experiment were lay people. Does the experience of professionals protect them from the illusion of validity? Einhorn and Hogarth asked this question when they noted that experienced managers had extraordinary difficulty in checking the claim of a consultant that he can forecast rises and falls in the stock market. They administered their experiment to 23 statisticians (faculty members and graduate students of statistics departments, who were attending a research seminar). Einhorn and Hogarth wrote:

> The importance of using high-level statisticians as subjects is that they are formally trained in testing statistical hypotheses, that is, null hypotheses are frequently formulated so that one can see whether they are rejected by the data. Consequently, if such subjects were to exhibit behavior similar to those of Wason, this would clearly be consistent with the notion that the habits of lower level cognitive functioning, for example, concrete reasoning, are strong.[15]

Subjects were provided with the following experimental stimulus:

> It is claimed that when a particular consultant says the market will rise (i.e., a favorable report), it always does rise. You are required to check the consultant's claim and can observe any of the outcomes or predictions associated with the following:
>
> 1. favorable report.
> 2. unfavorable report.
> 3. rise in the market.
> 4. fall in the market.[16]

Subjects were asked to circle the statement or statements that constitute the *minimum* evidence required to check the consultant's claim.

Consider each statement and its potential to support or contradict the consultant's claim. Subjects who asked for outcomes associated with *favorable reports* received information that the market rose, supporting the consultant's claim, or that the market declined, contradicting the consultant's claim. Subjects who asked for outcomes associated with *unfavorable reports* received information that can neither support nor contradict the consultant's claim; the consultant

made claims about outcomes associated with favorable reports, but he made no claims about outcomes associated with unfavorable reports. The reports associated with a *rise in the market* can be favorable or unfavorable; favorable reports support the claim, but unfavorable reports do not contradict the claim because it does not extend to unfavorable reports. Predictions associated with a *fall in the market* cannot support the consultant's claim, but can contradict it, because favorable reports contradict the claim; unfavorable reports are irrelevant to the claim, because it does not extend to unfavorable reports.

Einhorn and Hogarth summarized their results as follows:

> Of the 23 statisticians, 12 requested a single piece of confirmatory information (11 asked for Response 1, and 1 for either Response 1 or 3); 1 person asked for any of the four possibilities; 2 people asked for either Number 1 or 4; 3 people asked for Number 4 alone; and a mere 5 people indicated the correct response of 1 and 4. Results were thus somewhat different from those of Wason. First, no one committed the logical fallacy implied by choosing Responses 1 and 3. Second, there is some evidence that scientific training may make people more aware of the need to seek disconfirming information in that almost half the responses did include Response 4. On the other hand, the fact remains that when checking a rule concerning predictive ability, a majority of analytically sophisticated subjects failed to make the appropriate response. In particular, half of the subjects chose to examine the same piece of confirmatory information, that is, Response 1.

We suggest that investment professionals continue to believe that the sentiment index can forecast changes in the market because they are subject to the illusion of validity. Specifically, they focus on confirming evidence and neglect disconfirming evidence.

Consider the following problem: A proponent of the sentiment index claims that it can forecast increases and decreases in the DJIA. How can this claim be examined? A transparent presentation calls for dividing the pairs of forecasts and realizations in the sample into the four cells of a matrix such as Figure D.

The first cell contains positive hits, where an increase was forecast and an increase was realized. The second cell contains false positives,

Figure D Forecasts of Changes in Stock Prices and Realizations

Forecast \ Realization	Stock Prices Increased	Stock Prices Decreased
Stock Prices Will Increase	Positive Hits	False Positives
Stock Prices Will Decrease	False Negatives	Negative Hits

where an increase was forecast but a decrease was realized. The third cell contains false negatives, where a decrease was forecast but an increase was realized. The fourth cell contains negative hits where a decrease was forecast and realized. Positive and negative hits are confirming evidence. False positives and false negatives are disconfirming evidence. Correct analysis of the claim that the sentiment index is useful for forecasting the market requires examination of all four cells. An illusion of validity will persist, however, if people focus on positive and negative hits and neglect false positives and negatives.

The focus on confirming evidence is illustrated in statements such as that by Boland:

> The October Massacres of 1978 and 1979 were heralded by peaks in adviser optimism. And the November lows of both years found the tip sheets looking for lower lows.[17] .

Similarly, Dreman wrote:

> At the market high in late 1972, 75% of advisers predicted that stocks were heading skyward. Then at the bottom of the 1974 market—the worst break in the postwar period—two-thirds suspected stocks would continue to free-fall; not long thereafter we had the beginning of a major bull market.[18]

The cases presented by Boland and Dreman are hits, observations consistent with the hypothesis that the sentiment index is useful in forecasting changes in the DJIA. But what about

Table VI The Level of the Bearish Sentiment Index at Market Tops and Market Bottoms (standard deviations in parentheses)

	Mean of the DJIA	*Mean of the Index*
Market Tops	996 (144)	0.29 (0.13)
Market Bottoms	812 (141)	0.52 (0.18)
t-statistic of the difference between the means	4.35**	−5.00**

**Statistically significant at the 0.05 level.

false positives and negatives? How frequently did the sentiment index forecast a decline in the DJIA when, in fact, an increase followed? We find that the frequency of false positives and negatives is high. Indeed, the index is useless, not because it does not provide some good forecasts, but because it also provides so many bad forecasts.[19]

A Test

Proponents of the sentiment index argue that it is useful because advisers are bullish at market tops and bearish at market bottoms. Consider the following forecasting rule: Forecast a decrease in the DJIA when the sentiment index is more bullish than its average level at market tops; forecast an increase in the DJIA when the index is more bearish than its average level at market bottoms. If the sentiment index is useful in forecasting changes in the DJIA, we should find that it provided more positive and negative hits and less false positives and negatives than can be expected from a random process.

Market tops and bottoms are not well defined unless a period is specified. For example, each week contains a day when the market had a "top," but that top is likely to be no more than a minor blip when returns over a year are compared. Similarly, the DJIA was at a bottom in the summer of 1982 relative to its level in the immediately preceding and following years, but it was not at a bottom in the summer of 1982 if the observation period is extended to include other periods, such as the period starting in 1973.

We specified our period as a calendar year and looked at a total of 23 years. Each year had one market top, the highest level of the DJIA in that year, and one market bottom, the lowest

Figure E Forecasts of Changes in the DJIA based on Sentiment Index and Realizations in the Following Four-Week, 26-Week and 52-Week Periods*

Four Weeks

Forecast \ Realization	DJIA increased in the following 4 weeks	DJIA decreased in the following 4 weeks	Total
DJIA will increase (sentiment index exceeds 0.52)	54 (56.6)	55 (52.4)	109
DJIA will decrease (sentiment index is below 0.29)	54 (51.4)	45 (47.6)	99
Total	108	100	208

chi-square = 0.34 level of significance 0.56

26 Weeks

Forecast \ Realization	DJIA increased in the following 26 weeks	DJIA decreased in the following 26 weeks	Total
DJIA will increase (sentiment index exceeds 0.52)	14 (15.5)	12 (10.5)	26
DJIA will decrease (sentiment index is below 0.29)	14 (12.5)	7 (8.5)	21
Total	28	19	47

chi-square = 0.35 level of significance 0.55

52 Weeks

Forecast \ Realization	DJIA increased in the following 52 weeks	DJIA decreased in the following 52 weeks	Total
DJIA will increase (sentiment index exceeds 0.52)	12 (12.0)	4 (4.0)	16
DJIA will decrease (sentiment index is below 0.29)	9 (9.0)	3 (3.0)	12
Total	21	7	28

chi-square = 0.00 level of significance 1.00

*The cells contain the number of periods with the specified combinations of forecasts and realizations. The numbers in parentheses are the expected number of periods under the hypothesis that there is no relation between forecasts and realizations.

level of the DJIA in that year. In 1982, for example, the DJIA bottomed on Friday, August 13, at 784.34. The sentiment index registered 0.568. The DJIA top that year was on Friday, December 31, at 1070.55. The index registered 0.485. (The sentiment index is calculated each Friday, so market tops and bottoms are selected from closing levels of the DJIA on Fridays.) The mean level of the index at market tops was a relatively bullish 0.29; the mean level of the index at market bottoms was a relatively bearish 0.52. The difference between the two means is statistically significant, so we know that investment advisers are indeed more bullish at market tops than at market bottoms (see Table VI).

Can we use this finding as a basis for a successful forecasting rule? Consider the following rule: Forecast an increase in the DJIA when the sentiment index rises above 0.52, the relatively bearish level associated with market bottoms; forecast a decrease in the DJIA when the index falls below 0.29, the relatively bullish level associated with market tops. There were a total of 109 nonoverlapping four-week periods when the sentiment index exceeded 0.52 at the beginning of the period. The 0.52 level is consistent with a forecast that the DJIA will increase. The DJIA increased in 54 of these periods, but decreased in 55; in other words, we had 54 positive hits and 55 false positives. There were a total of 99 nonoverlapping four-week periods when the index fell below 0.29 at the beginning of the period, suggesting a forecast that the DJIA would decrease. The DJIA did decrease in 45 of these periods, but it increased in 54—45 negative hits and 54 false negatives. The difference between actual realizations and expected realizations does not differ by a statistically significant amount from what would be expected if chance governed the process. We obtained similar results for the 26-week and 52-week periods. (See Figure E.)

We offer the link between the persistence of the belief in the sentiment index and cognitive errors as a hypothesis, not as proof. Specifically, we made no systematic attempt here to subject the hypothesis to tests that might falsify it. Specific tests of the link between the sentiment index and cognitive errors will be the subject of future work. ■

Footnotes

1. J. Andrew, "Popularity of Contrary Indicator Spurs Questions about Usefulness," *Wall Street Journal*, November 28, 1984.
2. J. B. Cohen, E. D. Zinbarg and A. Zeikel, *Investment Analysis and Portfolio Management*, 5th ed. (Homewood, IL: Richard D. Irwin, 1987), p. 278.
3. See Andrew, "Popularity," *op. cit.*
4. *Investors Intelligence* (Larchmont, NY: Chartcraft Inc., November 26, 1984).
5. D. Dreman, "The Myth of Market Timing," *Forbes*, January 4, 1982, pp. 292–293.
6. For an extensive discussion of errors in cognition, see D. Kahneman, P. Slovic and A. Tversky, *Judgment Under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).
7. T. Gilovich, R. Vallone and A. Tversky, "The Hot Hand in Basketball; On the Misperception of Random Sequences," *Cognitive Psychology* 17 (1985), pp. 295–314.
8. D. Kahneman and A. Tversky, "On the Psychology of Prediction," *Psychological Review* 80 (1973), pp. 251–273.
9. H. V. Roberts, "Stock-Market 'Patterns' and Financial Analysis: Methodological Suggestions," *Journal of Finance* 24 (1959), pp. 1–10.
10. W. F. Sharpe, *Investments*, 3rd ed. (Englewood Cliffs, NJ: Prentice-Hall, 1985), p. 608.
11. Kahneman and Tversky, "On the Psychology," *op. cit.*, p. 249.
12. H. J. Einhorn and R. Hogarth, "Confidence in Judgment: Persistence in the Illusion of Validity," *Psychological Review* 85 (1978), Number 5, pp. 395–416.
13. P. C. Wason, "On the failure to eliminate hypotheses in a conceptual task," *Quarterly Journal of Experimental Psychology* 12 (1960), pp. 129–140.
14. *Ibid.*, p. 139.
15. Einhorn and Hogarth, "Confidence," *op. cit.*,
16. *Ibid.*, pp. 399–400.
17. J. C. Boland, "Stock Market Seers? Investment Advisers Are Usually Wrong at Turning Points," *Barron's*, September 1, 1980, p. 11.
18. Dreman, "The Myth," *op. cit.*, p. 298.
19. People tend to focus on positive and negative hits and neglect false positives and negatives. But false positives and negatives are not always ignored. For example, the initial hypothesis regarding the Bearish Sentiment Index was that bullish levels of the index would be followed by increases in the DJIA and bearish levels by decreases. Abe Cohen, editor of *Investors Intelligence*, said that he started tracking the opinion of investment advisers "hoping the advisers were correct" but, he added, "after keeping the figures for a couple of years I saw that it worked the other way." (Quoted in Boland, "Stock Market Seers?" *op. cit.*) Abe Cohen would not have rejected his original hypothesis if he ignored false positives and negatives.