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On the Social Psychology of the Stock Market: Aggregate Attributional Effects and the Regressiveness of Prediction

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The expectation that changes will either persist or regress to previous levels depends in large part on whether causal attributions are provided to explain recent changes. If these attributions are provided, then the tendency to make regressive predictions is diminished. It is argued that the news media provide such attributions and so cause aggregate-level changes in the predictions of those who receive these communications and thereby in receivers' subsequent behaviors. Causal attributions by members of the media should be expected to be more frequent and more extreme than those that would be generated by individuals who do not expect to communicate information to others. This aggregate attributional process, whereby one group acts on the attributions provided by another, is illustrated in financial markets. First, this research shows that the financial press explains recent changes in stock prices with good news after price rises and with bad news after price falls. In an experimental study, such news is shown to lead to less regressive predictions. The normative and theoretical implications of the results for economic and psychological processes are discussed.

Recent literature on prediction has emphasized the tendency of people to regress insufficiently toward the mean in making predictions (e.g., Gilovich, Vallone, & Tversky, 1985; Kahneman & Tversky, 1973; Nisbett & Ross, 1980). Regression, however, is not always the correct prediction. In an ongoing series, whether the best prediction is continued change, no change, or regression to previous average levels depends on whether the observed change is an aberration or a signal of a change in the underlying conditions (Einhorn & Hogarth, 1981). For example, if a basketball player surges into a hot streak, it is unlikely that one will predict the peak will last. But if the papers report that the streak coincides with the signing of a new multiyear contract that now pays him per basket, one is (and probably should be) more likely to predict continued superior play. The prediction depends on how recent changes are explained.

Many of the most important predictions we make are about entities we have observed over extended periods of time. Typically, we must learn slowly from experience. Consider the cases of parole officers recommending parole, stock brokers and investment analysts deciding whether to invest in a stock, teachers recommending pupils for promotion, or spouses deciding whether to leave a relationship or stay together. In each case, the prediction involves many direct observations of the entity that must be predicted, and in each case, the decision maker knows the time course of the observations. Given this common type of information, what do we predict predictors will predict?

Unfortunately, prediction studies experimentally using sequential information contain contradictory results. Sometimes people regress, that is, they behave as if recent changes will reverse in the future (e.g., Anderson, 1965; Jones, Rock, Shaver, Goethals, & Ward, 1968). Examples of regressive prediction have also been referred to under several other terms, including primacy effects, negative recency, anchoring, and the gambler's fallacy (Lepley, 1963; Phares, 1957; Skinner, 1942). Alternatively, in other situations, people predict nonregressively, as if recent changes will persist (e.g., Anderson, 1968; Gilovich et al., 1985; Mettee, 1971; Tversky & Kahneman, 1974; Zajonc & Brickman, 1969). What determines the type of prediction? Perhaps the most important factor is whether recent trends can be attributed to a stable underlying cause (see Ajzen, 1977; Tversky & Kahneman, 1980). For example, more people predict *win* from a cumulative record of *win-win-win-win-win* if the series is that of a football team—imputing team spirit, advanced coaching skills, superior players, and the like—rather than a series of coin tosses (Matthews & Sanders, 1984). If so, providing such attributions should lead people to make less regressive predictions.

Effects of the Media

The media are likely to lead their audience to make less regressive predictions by providing attributions for changes that differ both in number and in content from those that would be made by individuals acting alone. The maxims of good communication (Grice, 1975) will focus reporters on recent changes and draw them away from merely summarizing the present

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state of affairs. When a change occurs, there may typically be both a set of facts that suggests such a change should have happened and yet another set that suggests it should not have occurred. To form a coherent and complete story, reporters will tend to focus on the former set of information and omit the latter. With the media involved, fewer individuals will realize, for example, that when things have become so bad that they cannot get worse, matters can only improve. The press can speed commercial failure with reports and explanations of changes toward fiscal weakness (Kindleberger, 1978) and increase mortality with reports and explanations of increases in suicide and other types of violence (Phillips, 1986).

These selective attributions are not made in malice. The media provide them because, in a sense, to do so is part of the job. Newspeople are required to communicate information to others, and this requirement changes the way that people process information and the causal attributions they create. Compared with those who do not expect to have to communicate to others, communicators are more likely to organize and to polarize information as well as to ignore information that is unfamiliar and unexpected (Cohen, 1961; Hennigan, Cook, & Gruder, 1982; Higgins, McCann, & Fondacaro, 1982; Leventhal, 1962; Zajonc, 1960; Zajonc & Wolfe, 1966).

The bias toward explaining recent changes may be exacerbated by the tendency of communicators to form a greater number of attributions and to make more extreme attributions. Direct attributional questions—the "why" question that reporters are supposed to answer—instigate the attribution process (Enzle & Schopflocher, 1978; cf. Burnstein & Vinokur, 1973; Tetlock, 1983). Moreover, the factors that lead to spontaneous attributions in noncommunicators, such as salient, threatening, or unexpected events (Clary & Tessor, 1983; Lau & Russel, 1980; McArthur & Ginsberg, 1981; Pittman & Pittman, 1980; Pyszczynski & Greenburg, 1981; Taylor & Fiske, 1978; Wong & Weiner, 1981), lead to more extreme attributions by communicators (Harvey, Harkins, & Kagehiro, 1976).

By providing more attributions of greater coherence and extremity, the media increase the likelihood that individuals will expect recent changes to persist with no return to previous levels. The media provide explanations for past events, and undoubtedly, people often rely heavily on the information they are given. These explanations cause recent changes to appear less as chance results, and so there is less reason to expect them to fade away. The media, in short, cause people to make less regressive predictions. In the process of explaining the past, the media change predictions of the future.

Aggregate Attributions and Financial Effects

The process whereby attributions provided by the media affect the predictions of many actors—which we shall call an aggregate attributional process to differentiate it from individual and small-group processes—can be illustrated in the financial community. By explaining price changes, the press should cause prices to remain high after they have risen and to stay low after they fall. For example, to present a coherent explanation of an up change, the media are likely to report good news: searching for those facts from the many available that support such a change and ignoring those that do not. This news is likely to make investors who hear it more likely to buy or at least less likely to sell. It is difficult to imagine that investors would long be satisfied with a news service that ascribed down changes to good news or up changes to bad news. Galbraith (1979) noted that media warnings of economic distress given in the good years of 1927 and 1928 were often publicly lampooned before the debacle of 1929. Most economists agree that news may cause price movements.[1] We add simply that price movements may also cause news.

There is, however, a psychological force that counters the effects of the attributions the media provide, one that leads to highly regressive predictions. Predictions are often based on the representativeness heuristic: The future is assumed to be the most representative event given a particular model (Kahneman & Tversky, 1973). According to Tversky and Kahneman (1982), there are four cases for which representativeness can be defined. In predicting future prices with past prices, it is a case of calculating the representative value from the distribution. In these situations, they argue, the most representative value (i.e., a future price) will be close to the mean or median of the distributions of the relevant variable (i.e., past prices).

Consider how investors in a world without the media would thus react to a stock that started at 35 and rose about one point per day for 5 days, if they predicted by applying the representativeness heuristic to the price series. Suppose the price of our hypothetical stock went 35, 36¼, 36¾, 38¼, 38⅞, 40. The most representative value of this price series is less than the final value, somewhere in the high 30s. Thus investors applying the heuristic to these prices should sell, predicting regression back to the mean. Of course, if the media shift attention to the price changes, then investors are more likely to do the opposite. The most representative value of the change series +1¼, +½, +1½, +⅝, +1⅛ should lead investors to buy.

Regressive trading behaviors, which we shall call price *tracking*, have been shown to occur when traders are denied media attributions. Andreassen (in press), in a simulated market experiment, presented subjects with only price information (prices and price changes without news or identifying stock information). Subjects showed a strong tendency to track, that is, to buy after the price fell and sell as it rose. Such trading would cancel that of investors trading on the basis of media attributions. Although it would be easy to do so ("The stock went up, something really good must have happened!"), investors acting

[1] There is, however, little evidence that trading on the basis of such news is more profitable than doing the opposite. One of the basic tenets of the efficient market hypothesis, the dominant theory in the economics of finance, is that news causes price movements. But prices are held to reflect fully all available information (e.g., Fama, 1970), including information that is very recent. This assertion is supported by much evidence on earnings (e.g., Ball, 1972; Ball & Brown, 1968; Foster, 1978) and price changes (e.g., Fama, 1965; Hood, Andreassen, & Schachter, 1985; Osborne, 1959, 1962). Thus, trading on the basis of such news should fail to yield profits above chance levels, as the price has already adjusted. In fact, because trading is costly, it will generally lead to losses. For if the market is efficient, as economists maintain, then prices immediately reflect news, and any profits and losses associated with a news item accrue only to those who happen to be fortunate (or unfortunate) enough to hold the securities at the time the news breaks.

on their own do not form attributions that lead to nonregressive trading.

The prediction that follows from this line of reasoning is simple. Investors provided with explanations for recent changes in price should make less regressive predictions. Or to put the same in economic terms, they should be less likely to follow the laws of supply and demand, less likely to buy low and sell high.

Testing this hypothesis obviously demands that the media view recent price changes as we have suggested and that their audience interpret the explanations they offer in a reasonably homogeneous fashion. Otherwise the argument that the media changes the regressiveness of investor predictions by providing attributions is certainly without merit. To test this simple prediction, we had 12 naive graduate students rate media explanations. These were explanations of price movements of individual stocks drawn from the widely read "Abreast of the Market" columns in *The Wall Street Journal*.

Explanations of the market as a whole, measured by a market index such as the Dow Jones Industrial Average, appear in virtually every column, but they are often dozens of paragraphs long. To make the stimuli more manageable, we used the relatively short passages that appear for individual stock price movements. One month was chosen randomly from years at 5-year intervals between 1960 and 1980 (April 1960, August 1965, November 1970, November 1975, and June 1980). To space the stimuli over the course of the month, the first explanation of a stock price movement in a column was taken from the first two columns after the 1st, 10th, and 20th day of a month. Columns not containing any explanations of daily price changes of individual stocks (true of most Monday columns, which contain weekly market appraisals) were omitted.

The stories in most cases were presented exactly as they had originally appeared, but in a few cases some minor changes were made to make the stimuli easier to follow. The sentence with the price information was always given first, and unless the explanation was very long, sentences from separate paragraphs were grouped together. The five stories associated with the most positive relative price changes and the five associated with the five most negative relative price changes appear in Table 1.[2]

Raters were asked to rate the news on 9-point Likert scales, from *very bad* to *very good*, as if they were stockholders of the companies mentioned. They were told not to rate the price changes, only the news aspect of the story, and for half the raters information revealing the price movement was deleted. The effect was stronger with the price information present, with the differences between the two sets of ratings yielding $t(26) = 2.21$, $p < .05$. However, all 12 raters rated news associated with positive price movements as significantly better than news associated with negative price changes. Averaging the ratings across raters who saw no price information yielded $t(26) = 3.61$, $p < .002$; averaging across the price-present raters yielded $t(26) = 10.50$, $p < .0001$.

Having demonstrated the banal, we proceed to test for the effects that such news might have. Does good news presented after a positive change make an investor believe that the new higher price is not too high, and perhaps even that it will continue to rise? Does bad news have the reverse effect? To test for the effects of such information, we conducted a simulated market experiment. The hypothesis was that subjects trading a stock would be less likely to buy low and sell high if given news similar to that which the media would present. Half of the subjects received no news, and half received a few good-news headlines when the stock they were trading went up and a few bad-news headlines after it fell. If the hypothesis is correct, this should lead to changes in the subjects' trading strategy so that their behavior reflects more highly regressive predictions about the future.

Method

Overview

Each subject traded one stock on a microcomputer over 120 trials (or "days"). Subjects received $4.90 in assets at the beginning of the experiment, and their final payment depended on their success. Half of the subjects received 16 one-sentence news stories over the course of the experiment, and the other half saw none. The computer presented all of the stimuli and kept track of the trading, and the experimenter was not present during the actual experiment.

Stimuli

News was drawn from a pool of 16 pairs of one-sentence fictional news items. Both members of a given pair were about the same general topic, but whereas one was good news (e.g., "Company announces dividend increase"), the other was bad (e.g., "Company announces dividend decrease"). Every news subject saw only one member from each pair so that subjects would not read contradictory stories.

Price stimuli were created from historical data. All stimuli series were rescaled to start at 35 cents. Three stock-price series, chosen randomly from the Dow Jones Industrials (Allied Chemical, Goodyear, and U.S. Steel), were used to generate a total of 18 series of stimuli. Variance type was manipulated by leaving the price changes the same relative size as in the original series or making them 7 times as big, and each subject saw the same series twice, once in high variance and once in low. (Andreassen, in press, demonstrated that volatile prices increase trading.) The trends of the series were manipulated so that one third would rise 25% from the first to the last trial (bull condition), a third would end at the starting value (stable), and a final third would fall 25% (bear). (Price stimuli and the story headlines are reproduced in Andreassen, 1984.)

This yielded a 3 (stock) × 2 (variance type: high or low) × 2 (variance order: high–low or low–high) × 3 (price trend: bull, stable, or bear) × 2 (news or no news) design. All manipulations, with the exception of variance type, were between subjects, and the design was balanced, with the exception of variance order (which was balanced as well as the design allowed).

The news in the news condition was coordinated with the price stimuli. The presentation order of the 16 pairs was randomized for each subject so that the various topics appeared for different subjects at

[2] There are several interesting points about the stories, which can be noted in Table 1. First, some stories contain phrasing that suggests the possibility that conditions will continue to change (e.g., "beginning to cause" and "may launch"), but none of them contains explicit predictions about future price movements. Second, the language of causality is missing. Stories typically omit such words as *because, thus, and so,* and *therefore.* At most, price changes are "ascribed indirectly" or only "in part." Most often, no direct or indirect causal terms are used, or some event is said only to occur "after" or to have "coincided" with price changes. Finally, the explanations, often rich in detail, are nonetheless quite simple (Fischhoff, 1980). Prices, it seems, rise because of buying and fall because of sales.

Table 1
Five Most Positive and Five Most Negative Relative Price Change Stories

Most positive changes
June 3, 1980, p. 47, paragraph 11: Among the takeover candidates, Financial Federation *leaped 9¾ to 38¼* [+34.2%] after a merger proposal was made by a unit of Great Western Financial.
April 12, 1960, p. 27, paragraph 5: United Stores second preferred led the market in activity, *advancing 1¼ to 12⅛* [+11.5%], a new 1960 *high*, on turnover of 99,300 shares. After the close, Harry H. Wachtel, executive vice president of the BTL Corp., disclosed that BTL yesterday pushed its holdings of United Stores to "slightly in excess of 50% of the voting stock." BTL, the former Butler Brothers store chain, sold its assets two months ago for $50 million and has since been buying stock in United Stores.
August 20, 1965, p. 21, paragraphs 7, 8, and 9: On the New York Stock Exchange, some fairly dramatic *gains* were registered by the gold stocks. American South African Investment *rose 7 to 74¼* [+10.4%]. Gerald P. Murphy, of Winslow, Cohu & Stetson, attributed a sudden pick-up in demand for gold stocks to London's economic problems. The general heaviness in stocks that developed late in the day coincided with reports that tough measures taken by the United Kingdom to protect the pound sterling were beginning to cause industrial cutbacks and employee layoffs in several important segments of the British economy.
November 3, 1970, p. 25, paragraph 13: In the glamor group, Telex *climbed 1⅜ to 4½* [+6.0%] as the most active issue: Its volume of 78,900 shares included a trade of 25,000 at 3⅜. Brokers ascribed part of the *strength* among the volatile issues to some short-covering, or buying of stock to replace borrowed shares sold earlier.
June 2, 1980, p. 43, paragraph 16: ERC Corp. stock *soared $4.25* [+5.8%] in Friday's over-the-counter trading to close at $77.50 bid amid rumors that Getty Oil Co. may launch a $100-a-share friendly takeover offer to rescue the Kansas City Mo. based reinsurance concern from Connecticut General Insurance Co.
Most negative changes
November 20, 1975, p. 47, paragraphs 6 and 16: Marine Midland Banks *slid 4⅜ to 13* [−26.2%]. Marine Midland Banks Inc. slashed its dividend to 20 cents a share from 45 cents and would show a loss in the fourth quarter.
June 20, 1980, p. 47, paragraph 12: City Investing was the Big Board's most active stock, *dropping 2 to 27* [−6.9%] on 1,079,000 shares: a block of 500,000 shares, handled by Salomon Brothers and Herzfeld & Stern, traded at 28. A block of 100,000 shares also moved at 28, handled by Salomon. Tamco Enterprises recently rumored to have bought large blocks of the diversified real estate and insurance concern, remained silent yesterday. Privately owned Tamco had offered $30 a share for City Investing but was rejected. The stock was hurt by profit taking, aided by unconfirmed rumors that Tamco had stopped buying City Investing shares, several analysts said.
April 1, 1960, p. 23, paragraph 6: Polaroid *plummeted 14¾ points* [−6.4%] on volume of 21,500 shares. The stock had risen 11⅛ Tuesday and 10½ Wednesday. A vice president of the company told the Philadelphia Security Analysts yesterday Polaroid would earn 50 cents a share in the first quarter.
April 20, 1960, p. 29, paragraph 8: The most active stock was Ampex, which *dropped 2⅛* [−6.4%] on volume of 85,000 shares. The *decline* was ascribed indirectly to news Minnesota Mining and Radio Corp. of America may be beginning a battle in the tape recording field, in which Ampex's business is concentrated. Monday M.M.M. announced purchase of the Mutual Broadcasting System, a move said to be connected with the contest with RCA. Ampex manufactures tape recorders as well as recording tape.
November 4, 1975, p. 43, paragraph 17: A big *casualty* among blue chips was United Technologies, which *fell 3⅛ to 49¼* [−6.0%]. The company filed a new offer for Otis Elevator common, and Dana Corp. and Otis terminated their merger talks.

Note. Dates and pages refer to articles in *The Wall Street Journal*. Percent changes (shown in brackets) not in originals. Portions deleted for the no-price-information group of raters appear in italics. (There were no italics in the originals.)

different times. The spacing of the news trial was also varied. Eight trials (spaced at least three trials apart) were randomly chosen in the high-variance interval. Good members of the pairs were presented on the four news trials (in high variance) with the greatest positive price movement from the previous news trial. Bad members were presented on the other four news trials.

Placement and type of news during the low-variance trials was yoked to the high-variance trials. Thus each news subject saw 4 good and 4 bad stories in both high-variance and low-variance conditions (16 stories total).

Subjects

The subjects were 27 men and 27 women recruited from the paid subject pool at Columbia University.

Procedure

Subjects were given several practice trials (before the price changes were read into the machine) to learn how to use the computer. The computer displayed the trial number, the time remaining (counting down from 20), the subject's holdings, the price, and price change. If there was no news and the subject did not try to trade, no other information appeared. If there was news, then it appeared in the center of the screen for the duration of the trial. The machine beeped at the beginning of news trials so that subjects would be unlikely to fail to notice it. Subjects were not allowed to buy on margin or sell short. The screen went blank for 2 s at the end of each trial.

Subjects were given several practice trials before the start of the experiment. When the subjects knew how to use the keyboard properly and understood the information on the screen, they were assigned to condition. The experimenter then explained that the stock the subjects were about to trade had been picked randomly from those listed on the New York Stock Exchange. If the subject was in the news condition, the experimenter then said:

> You'll also be getting any news story that was in the *Journal* about the stock. You won't get the whole story, just the headline, and it will come onto the center of the screen and make a lot of noise so that you won't miss it. You'll also be getting any story that was about a change in a major economic indicator.

The experimenter explained that all decisions were up to the subject, and after answering any questions, started the computer and left the room.

Dependent Measures

The three dependent measures of the subject's behavior were tracking correlations, profits, and the number of shares traded. The key dependent measure of the subject's strategy was the tracking correlation. Tracking correlations are product-moment correlations computed by subject separately for the high-variance and low-variance trials between the price of the stock and the number of shares held at the end of the trial. With high tracking—subjects buying heavily when the price is low, selling when the price is high—these correlations become more negative. Converting the tracking correlations to z scores had no effect on the analysis, so these data are omitted.

The other strategy measure was profits, which are sensitive to differences in strategy in the high-variance interval. Profits were measured by dividing (a) the change in the value of a subject's assets from the beginning to the end of an interval by (b) the value of the assets at the start of the interval and then dividing this relative measure of return by (c) the number of shares traded during the interval. Profits measure tracking in the high-variance interval because of the generation process

used to create the price stimuli. In the high-variance interval, the price range is relatively large (over 100%), but the change in prices from the first to the last price of the series is small (about 12%), so buying when the price appears low is usually profitable. The measure is calculated on a per share basis because (ignoring the obvious effects of price trend) if Subject 2 trades two shares each time Subject 1 trades one, then both show the same level of tracking, but Subject 2's returns are twice as high (or twice as low) as Subject 1's.

The disadvantages of profits as a measure of strategy are that they are affected by price trend and are sensitive only in the high-variance interval. These flaws make tracking the superior measure. However, the profit measure makes up for the one flaw of the tracking measure. If the subjects make high profits, they can hold more shares at the end of the interval than at the beginning. Obviously, the tracking measure becomes obscured if what it means to "hold a few shares" changes between the beginning and the end of the trials.

The measure of number of shares traded is most relevant to real-world volume of trading. Commission charges paid for trading are highly correlated with the number of shares traded, so this measure also serves as a proxy for the costs a subject's strategy would incur if used in a real market.

Results

Analyses of variance (ANOVAs) with news, price trend, and variance order as between-subjects factors and variance type as a within-subjects factor were run on the dependent measures of tracking, trading, and profit.

The key question addressed by the study is whether news causes subjects to make less regressive predictions. If this is the case, tracking correlations should be weaker in the news condition. The ANOVA on the tracking data revealed strong support for the hypothesis, with a strong main effect of news, $F(1, 42) = 11.14$, $p < .005$. The mean level of tracking was $-.30$ for the combined high-variance and low-variance groups in the news condition, compared with $-.56$ in the combined no-news condition. There was also a strong main effect of variance type, $F(1, 42) = 27.73$, $p < .0001$, with stronger tracking in the high-variance interval. Means of the tracking by variance and news condition are shown in Table 2.

The results on profits also supported the hypothesis that news would lead to less regressive predictions, for the subjects given news made a lower percent return per share traded in the high-variance interval. The main effect of news yielded $F(1, 42) = 7.01$, $p < .02$. The main effect of variance type yielded $F(1, 42) = 37.98$, $p < .0001$. Finally, the interaction between news and variance type yielded $F(1, 42) = 3.76$, $p < .06$. As seen in Table 3, news subjects earned less per share than did the no-news subjects in the high-variance condition. But in the low-variance condition, in which tracking has little effect, the effect of the news manipulation on profit was trivial.

Table 2
Tracking in High and Low Variance by News

Variance type	News	No news	t[a]
High	−.46	−.68	2.38*
Low	−.14	−.44	2.89**
t[b]	3.71***	4.08***	—

Note. All p values are two-tailed.
[a] $df = 52$.
[b] $df = 26$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Profits in High and Low Variance by News

Variance type	News	No news	t[a]
High	.22	.50	2.34*
Low	−.01	.01	0.51
t[b]	2.92**	5.64***	—

Note. Profits are calculated as the percent change in assets over an interval divided by the number of shares traded. All p values are two-tailed.
[a] $df = 52$.
[b] $df = 26$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Not surprisingly, subjects made more if the price rose than if it fell, and the main effect of price trend was significant, $F(2, 42) = 7.06$, $p < .01$. Overall, subjects reported enjoying the experiment, and many made substantial profits during the high-variance interval. The average high-variance profit was 17.2% in the news condition (70% of the subjects made a profit) and 27.0% in the no-news condition (89% of the subjects made a profit).

One serious problem could have arisen regarding order effects. If subjects were to perform significantly better in the second half of the experiment than in the first, it would be unclear whether they were actively generating a strategy in the second half of the experiment or merely following a pattern learned in the first half. However, controlling for variance type, subjects actually did worse in the second half of the experiment. The ANOVA on tracking revealed a significant interaction between variance order and variance type, $F(1, 42) = 4.16$, $p < .05$. Subjects in the high–low condition showed stronger high-variance and weaker low-variance tracking than did the subjects in the low–high condition. (Subjects in the high–low condition often remarked that for the latter half of the experiment the price never seemed to move.) Data on profits yielded similar conclusions. Subjects made more in the high-variance interval when it appeared first, with the interaction between variance order and variance type yielding $F(1, 42) = 6.37$, $p < .02$.

Overall, the level of trading was high, with subjects trading on average between 5% and 10% of their portfolio per trial. Trading means appear in Table 4 broken down by news condition and variance type. News subjects traded more shares, but the difference did not reach standard levels of significance, $F(1, 42) = 3.84$, $p < .06$. The main effect of variance type was significant, $F(1, 42) = 16.79$, $p < .001$. Subjects traded on the basis of price movements, so greater movement caused greater trading.[3]

Discussion

The data strongly support the hypothesis that media explanations counteract the tendency of the investors who read them

[3] The effects of variance are obviously very strong. They are irrelevant to this experiment but are discussed extensively in Andreassen (in press).

Table 4
Trading in High and Low Variance by News

Variance type	News	No news	t[a]
High	100.1	67.6	1.86*
Low	66.1	46.4	1.77*
t[b]	3.13**	3.28**	—

Note. All p values are two-tailed.
[a] $df = 52$.
[b] $df = 26$.
* $p < .10$. ** $p < .01$.

to expect regression back to previous levels. The inclusion of news led to behaviors suggesting less regressive predictions. Tracking correlations fell with the inclusion of news, and profits per share traded fell in the high-variance condition.

However, news did not come as close to eliminating regressive tracking behavior in the high-variance condition as it did in the low-variance condition. Apparently, large changes require more or more potent explanations than small changes do. This suggests several possibilities. First, perhaps with large price changes, more potent explanations are offered by the media and explanations are more vigorously sought, resulting in increased gossip and sharing of tips, increased circulation of economic reports, higher ratings of financial programs on television, and the like. Alternatively, there may be a limit to what news can explain. If so, we should expect to find that the autocorrelations of price changes—the correlation between today's price change and the previous day's—will be more negative during volatile periods than during quiescent ones. In fact, although prices rose in both periods, the autocorrelation of changes in the Dow was more negative in the roaring 1920s than in the relatively boring 1950s.[4]

Subjects performed more poorly in the second half of the experiment. One simple explanation is that subjects performed poorly as a result of growing complacency, boredom, or exhaustion. Alternatively, behavior may have become less regressive in the second half of the experiment as a result of an increase in the saliency of the trend, because this would have drawn the subjects' attention to the price changes rather than the prices. Andreassen (in press) found that subjects were less likely to form regressive predictions about price movements if given only the price-change information. Saliency of trend would also help explain the high-variance and low-variance tracking differences, for as the variance increases, trend becomes more difficult to discern. As discussed earlier, if a stock increases in value, then applying the representativeness heuristic to the prices yields a sale whereas applying the heuristic to the price changes yields instead a buy.

These findings, of course, need not be constrained to the prediction of stocks. Consider how the low–high variance effect might apply to spouses observing each other over time. Highly volatile marriages may persist because any long-term trend is obscure, whereas quiet marriages, seemingly peaceful to outsiders, may end in divorce when a clear, slow but steady downward trend becomes apparent. At the larger level, some seemingly sociological phenomena may be reinterpretable as the effects of aggregate attributional processes. Several major newspapers no longer feature suicide reports on the front page, because these reports increase the frequency of suicides in groups who match the demographic characteristics of the original victim (Phillips, 1986). The secondary suicides may not simply be the results of modeling. Suicide stories not only report the taking of life, but often explain its causes. Such explanations undoubtedly affect those who match the characteristics of the original victim more than those who do not.

Finally, there are two economic implications of this research that should be noted. First, it has been shown that price-change variance is too high to be efficient (Grossman & Shiller, 1981; Shiller, 1981; see also DeBondt & Thaler, 1985). Heavy trading has been shown to affect price changes (e.g. Scholes, 1972), and the excess trading generated by large price changes and news should therefore cause prices to become more variable than they would otherwise be. Second, one might very well ask how much news an investor ought to try to absorb (cf. Simon, 1957), given that in the process of explaining the past, we may allow ourselves to justify the present. When a news story breaks, investors should ask themselves whether anything, other than the price, has really changed. The old saw "no news is good news" may be more profound than it seems.

[4] This saw-tooth pattern occurs at the trade-to-trade level (Niederhoffer & Osborne, 1966). At this level, transactions occur too quickly for the media to explain, and the effects of tracking should predominate. At intervals as large as a day, a point at which tracking and news effects might be expected to offset each other, prices are well modeled by random walks.

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