

# **Cognitive Dissonance and Mutual Fund Investors**

**William N. Goetzmann**  
Yale School of Management

**Nadav Peles**  
Columbia Business School

First Draft: March, 1993  
Current Draft: November 22, 1995

Please address correspondence to:

Professor William N. Goetzmann  
Yale School of Management  
Box 208200 New Haven CT 05620-8200  
(203) 432-5800

## ABSTRACT

We present evidence from questionnaire studies of mutual fund investors about recollections of past fund performance. We find that investor memories exhibit a positive bias, consistent with current psychological models. We find that the degree of bias is conditional upon previous investor choice, a phenomenon related to the well known theory of cognitive dissonance.

The magnitude of psychological and economic frictions in the mutual fund industry is examined via a cross-sectional study of equity mutual funds. We find an unusually high frequency of poorly performing funds, consistent with investor "inertia." Analysis of aggregate dollar investments however, shows the net effect of this inertia is small. Thus the regulatory implications with respect to additional disclosure requirements are limited.

We examine one widely documented empirical implication of mutual fund investor inertia: the differential response of investment dollars to past performance. We perform tests that control for the crucial problem of survivorship. These confirm the presence of differential response, but find the effect is confined to the top quartile. There is little evidence that the response to poor performance is unusual.

## Introduction

One of the greatest mysteries in the mutual fund industry is why some investors tend to stay with funds that consistently perform poorly. A number of papers have noted that investor dollars flow into winning funds more rapidly than they flow out of losers. This differential has been taken as evidence of irrationality (Ippolito, 1992), differential management services and high transactions costs (Sirri and Tufano, 1992) and a failure of investor probability heuristics (Harliss and Peterson, 1994). In this paper, we provide evidence that investor psychology may play a role in the fund switching decision. Questionnaires taken from two different groups of mutual fund investors suggest that investor aversion to switching from poor performers may be explained by overly optimistic perceptions of past mutual fund performance. Samples of both educated and casual mutual fund investors show that investor recollections of past performance are consistently biased above actual past performance. This bias in recollection may be the mechanism by which investors justify remaining in consistently poorly performing funds. While investor inertia might be actually be due to high economic switching costs, our evidence suggests that investors none-the-less adjust their beliefs to support past decisions.

The tendency to adjust beliefs to justify past actions is an example of the psychological phenomenon termed by Festinger (1957) as *cognitive dissonance*. Festinger's theory asserts that individuals are distressed by conflicting cognitive elements, such as a discrepancy between empirical evidence and past choices and thus they alter their beliefs to reduce this discomfort. The key feature of dissonance is that individual beliefs are altered to conform to their past actions. In the context of investment decision-making, cognitive dissonance can be thought of as a psychological *cost* that investors may seek to reduce through adjustments in beliefs about the efficacy of past investment choices.

The theory of cognitive dissonance has long been useful in studies of consumer behavior.<sup>1</sup> Erlich, Guttman, Schonback and Mills (1957) for instance, examined consumer responses to advertising literature following a major purchase decision -- the choice of a new car. They found that new car owners selectively noticed advertisements that re-enforced the efficacy of their recent decision. The advertisements reduced the uncertainty they felt about the wisdom of their choice. Akerlof and Dickens (1982) consider the role of cognitive dissonance in the labor market. They show how a rational individual may adjust beliefs about the risk of the job in order to reduce dissonance. The choice of a mutual fund is no less anxiety-producing than the choice of a new automobile, or a new job -- indeed it is arguably more so.

The possible psychological basis for investor behavior has been investigated by a number of researchers in recent years. For example, De Bondt and Thaler (1985) argue that mean reversion in stock prices is evidence of investor overreaction - where investors over-emphasize recent firm performance in forming future expectations. Shiller (1984) interprets evidence of excessive volatility in asset returns as suggestive of investing "fads". De Long, Shleifer, Summers and Waldmann (1990) incorporate irrational traders with erroneous stochastic beliefs into a model of asset markets in an attempt to explain the equity premium puzzle. These and related studies of financial market behavior have typically focussed upon price and return behavior in order to infer something about investor attitudes, beliefs and behavior.<sup>2</sup> There is mounting experimental evidence regarding the role of investor psychology in decision-making.

Thaler, Kahneman and Knetsch (1992), for instance, find an "endowment effect" among subjects endowed with even a relatively low cost gift. Samuelson and Zeckhauser (1988) find an endowment effect among experimental subjects asked to consider different investment strategies.

In this study, we offer some direct evidence of investor beliefs, based upon actual, rather

than hypothetical choices about investments. Our findings are consistent with an endowment effect. In addition, we have a small but unique sample of responses that allow us to differentiate between an endowment effect, and beliefs conditional upon past choice.<sup>3</sup> The experimental evidence in the cognitive psychology literature tells us that we should expect *both* mechanisms to influence investor beliefs and actions. In fact, on this smaller sample, we find evidence for both a dissonance effect and a strong endowment effect.

This paper is organized as follows. The next section describes the questionnaire sample and discusses the results. The third section discusses the implications of psychological and economic frictions among investors, and presents some empirical evidence to suggest its magnitude. The fourth section relates the questionnaire evidence to known patterns of cash flows in and out of mutual funds.

### **Mutual Fund Investor Questionnaire**

While information about mutual funds is broadly accessible, information about investors is not. Because of the obvious desire for privacy there is no single source of information about mutual fund investors that identifies personal investments. Consequently, we used a questionnaire to gather information from a number of mutual fund investors. The questionnaire requests information about exactly what mutual funds they use, and how they believe these funds performed in the past. We collected two separate samples from mutual fund investors. The first sample was collected from members of a state chapter of the *American Association of Individual Investors*. Presumably, this group is well informed about the historical performance of their investments, relative to the general population. The subjects of the second sample are a group of professional architects who have a defined contribution profit-sharing plan, and who also invest in mutual funds. Their profit-sharing plan has a useful feature for our purposes: it

does not allow the beneficiaries to choose among differing plans and managers. Thus, the profit-sharing plan may be considered an endowment for the vested employee, while the subjects' personal mutual fund investments require choice.<sup>4</sup>

The questionnaire for both groups asked for a list of the mutual funds owned by the respondent, an estimate of the difficulty in choosing the fund and whether it is a load fund. In addition, the questionnaire, (circulated in 1993) asked for an estimate of the 1992 return of the fund, and an estimate of the percentage by which the fund led or lagged a benchmark.<sup>5</sup> Subjects were asked how many years of poor performance it would take before they switched to another fund, and finally, how satisfied they are with the manager's performance. Subjects in the second group were asked to estimate the absolute and relative performance of the profit-sharing plan, and asked to estimate their satisfaction level with the manager as well.

The results of the two groups were analyzed separately. The absolute and relative performance estimates for mutual funds were compared to actual performance figures available from Morningstar Inc. Morningstar provides summary performance statistics for the entire universe of U.S. mutual funds, on a raw and risk-adjusted basis. This allowed us to calculate the spread between what investors *thought* they earned on their fund holdings versus what they *actually* earned. Sample I contained twenty-nine questionnaire responses tabulated in Table I. These included information about fifty-seven mutual fund investments. The results indicate that even relatively sophisticated investors displayed a positive bias in their recollection of past fund performance. Sample I investors overestimated the actual fund return by 3.40 percentage points. When asked to estimate whether their fund beat the appropriate benchmark, the results were even stronger. The estimate average relative return exceeded the actual relative return by 5.11 percentage points, which was significant at the 95% level. Not surprisingly, Sample I investors expressed a high level of satisfaction with their choice. On a scale of one to ten, with

one being very satisfied, the average score was 2.41. While their recollections were rosey, this chapter of the Association of Individual Investors managed to beat the benchmarks by an average of 6.57%. So the interested investor group did well, but not as well as its members thought.<sup>6</sup>

Investors did not consider themselves slow to respond to a drop in performance. When asked how low they would remain with a fund that failed to beat the benchmark, the average response was 2.15 years -- a relatively short interval, given the statistical difficulties in identifying a fund as a winner or a loser. This last response is interesting in light of the hypothesis that investor's unwillingness to remain in poorly performing funds is due to transactions costs. If transactions costs were recognized by investors as high, then we might expect this to be reflected in how long they would wait until withdrawing their investment. Instead, respondents *claim* to have a relatively high level of impatience with underperformance. The analysis of the first sample is consistent with psychological motives for remaining in underperforming mutual funds. It suggests that the cognitive processes potentially used to justify investor inaction are based upon biased beliefs regarding past performance. These biased beliefs are it turn consistent with the endowment effect as well as the dissonance effect.

Sample II is much smaller, but has a unique feature that allows us to distinguish between an endowment effect and a dissonance effect. Sixty questionnaires were circulated to professionals in an architecture office. Those who invested in mutual funds and/or were vested in the company profit-sharing plan were invited to respond. Twelve questionnaires were returned, and these yielded response information on twenty-nine investments: eighteen mutual funds, and eleven profit-sharing plan shares.<sup>7</sup> The analysis of these responses are reported in the second column of Table I. While the sample size from this sample is small, the results are quite interesting. On average, respondents overestimated the annual return of the fund or plan

by 6.22 percentage points. Respondents overestimated the amount by which the fund or plan exceeded the benchmark as well, but by a slightly lower margin: 4.62 percentage points. When we separated these results according to whether the investor had a choice of manager or not, we found that the optimism in total returns was *markedly higher* for the mutual fund sample: 8.58% compared to 2.36%. The difference was smaller, but positive for relative returns as well. In other words, when we condition upon investor choice, investors have a higher opinion of their personal choice.

The relative satisfaction with the manager differed according to whether the subject had control over the selection as well. Sample II subjects were asked to rank satisfaction with the manager on a scale of one to ten, with one equalling extreme satisfaction. When subjects had a choice of manager, they expressed relative satisfaction, averaging 4.17. When subjects had no choice, they expressed relative dissatisfaction: 5.64. This is extraordinary, given their optimistic recollection of the profit-sharing plan performance. Subjects appear not to base satisfaction on performance relative to a benchmark. Since the questionnaire invites direct comparison, it may be that they were expressing dissatisfaction relative to the mutual fund alternative. Similar to Sample I, Sample II respondents considered the choice of fund relatively easy, scoring the task over the middle value of five. AAIL members considered the task somewhat easier, perhaps because they manifestly enjoy investing. Were the architects any better at picking funds than the more sophisticated investors? Apparently not. Their average relative return was near zero.

### **Aggregate Effects of Psychological and Economic Switching Costs**

Another source of information about investor behavior are the mutual funds themselves. Morningstar, Inc. surveys virtually all public available mutual funds in the U.S., and reports past pricing statistics such as returns and standard deviations as well as net asset values. This

provides rich cross-sectional information which may be used to estimate how many consistently poorly performing funds exist, as well as to investigate the investor dollars in these poor funds.

We begin by examining the relationship between fund investment, and the probability that a fund mean exceeds the riskless rate. Unfortunately, given that the Morningstar sample includes only currently extant funds, we have a survivorship-biased sample. Thus, it is difficult to correctly estimate the unconditional probability of a positive excess return of a fund. An approximation, *conditional upon survival* is a function of the Sharpe ratio, scaled by the square root of the sample period of observation.<sup>8</sup> Figure 1 plots the fund scores against the cumulative distribution of funds, shareholders and investor dollars for all "Growth" mutual funds with at least a three year track record. Notice that the median fund has a score of about one, indicating that the typical fund does not have a very high probability of exceeding treasury bill rates. In fact, as many as 5% of the funds have *negative* Sharpe ratios over their reported history. Even with a three year history, it is hard to understand how such a fund can survive. At the other end of the scale, only about 10% of the funds have Sharpe ratios over two. In other words only a small fraction of the funds have a high probability of exceeding treasury bills. We cannot attribute this distribution pattern to irrational investors, however. The decision to shut down or merge a mutual fund is not the investors', but the investment company's. It is based upon the current or expected future profitability of the fund, not upon any measure of performance. Figure 1 also shows the distribution of shareholders. This tells a very different story. There are virtually no investors holding funds with negative Sharpe ratios. Approximately 20% of the investors hold shares in funds with Sharpe ratios over two. The median investor holds shares in a fund with a Sharpe ratio of about 1.5. The third cumulant in the figure represents the fund dollars. Nearly half of the invested dollars are in funds with Sharpe ratios over two. The dollar cumulant lies

everywhere below the shareholder cumulant. This is what we would expect, since we have conditioned upon past performance -- investors who selected the winning funds are now, on average, wealthier.

One natural question to ask is why most wealth is not invested in the funds with the highest probability of exceeding treasury bills. In fact, it may be, but our simplistic measure of probability fails to identify it as such. The funds we observe have been subject to performance hurdles throughout their existence. Brown, Goetzmann, Ibbotson and Ross (1992), for instance, show that there is not only an average bias in the fund mean induced by survivorship, but that the bias for an individual fund is positively related to its variance. A rational investor using past returns will condition upon the probability of having survived. Even when all funds have the same mean, the higher variance funds that survive will appear to have a higher expected return. Thus, we cannot conclude that the average fund investor is irrational for not selecting a fund with a Sharpe ratio over two. Indeed, the heavy dollar weight on funds with high Sharpe ratio may be ignoring the possibility of regression towards the mean.

In sum, the cross-section of mutual fund investments suggest that while cognitive dissonance may be a factor in investment decision-making, it is not a major problem in the mutual fund industry. There are not large pools of wealth invested in obviously underperforming funds, despite the fact that investors appear to be overly optimistic about their past investment choices and/or investment endowments. This has important implications for regulatory policy.

There is considerable interest in requiring mutual fund managers to state the risk and return characteristics of their funds in common terms so that investors can make educated choices.

We find little evidence that the investing public lacks sufficient or relevant information about past performance. Had the number of shareholders or the dollars invested in bad performers been high, this conclusion would be unwarranted. The existence of a large sector of the investing

public holding shares of consistent underperformers would warrant a closer regulatory look. Such is apparently not the case.

One possibility suggested by the distribution of funds versus the distribution of fund dollars is that the investors in poor funds are not really investors, but principals in the mutual fund companies themselves. It is tempting to believe that companies "prop up" losing funds with small amounts of capital in order to keep them alive. The motivation for such support is clear. If the ugly duckling ever turns into a swan over the long term, then it will have a long track record that can be promoted. The fund can be revived at some future date, not as a start-up, but as a long-term performer. Thus, perhaps investment companies as "investors" in poor performers are motivated by the long-term option value of the fund. If this were the case, we would expect to find a large number of funds with only a few investor accounts. Figure 2 plots the cumulative distribution of fund size, measured by number of investors. Nearly 10% of the growth funds in the sample have 100 or fewer investors, despite clear economies of scale in the industry. Consequently, even the small number of accounts we find with negative Sharpe ratios may actually be maintained by the mutual fund company, rather than by disinterested investors.

### **Differential Response to Past Performance**

Several researchers have pointed out that investor dollars flow into funds that have superior track records (see for instance, Ippolito, 1992, Sirri and Tufano 1992, Patel, Hendricks and Zeckhauser, 1990 and Kane, Santini and Aber, 1991). This is *prima facie* evidence of rational probability assessment: investors appear to act on the possibly rational expectation that past performance predicts future performance. This rational response, apparently differs conditional upon whether the fund did well or poorly. Sirri and Tufano (1992), for instance find that money flows slowly out of losers, and quickly into winners. This differential response

os suggestive of economic or psychological switching costs. It seems that once investors have selected a fund, they tend not to chase recent winners.

One problem with identifying differential response is the survivorship factor. Good performers tend to survive, while poor performers are often merged into other mutual funds. Brown, Goetzmann, Ibbotson and Ross (1992) show that survivorship bias is potentially severe in repeat-winner studies. Hendricks, Patel and Zeckhauser (1992) show how a pattern of censorship can induce a "U" shaped response in repeat-winner studies.<sup>9</sup> Survivorship is even more of a problem in cross-sectional analysis that predicts future cash flows based upon current performance. This is because survivorship is directly related to the value of the dependent variable. A poor performer that *survives* from period to period will be a fund that has relatively low cash outflows. Thus, absent a correction for survivorship bias, one would expect to observe differential response of cash flows to performance. Any test of differential performance must address the survivorship issue. To address this problem, we use a database that contains information about defunct funds.<sup>10</sup> This allows us to identify funds that disappeared, and to make the conservative assumption that a defunct fund had a negative 100% outflow in the year of its disappearance.

Our test of the differential response follows Sirri and Tufano (1992). We regress this year's new money on last year's fund return, including year dummies to capture annual differences in mean returns and flows. We explicitly test for differential response dividing fund returns into quartiles and then performing a Chow test of equality across the four coefficients. Table II reports the results. Each year except for 1978 is assigned a dummy variable. The response to the other explanatory variables is constrained to be the same across years. The combined regression suggests that the relationship between new money and last year's return is positive and significant. Table I also reports an unconstrained regression for which the returns

for each year are divided into quartiles. Notice that the response is only significant for the best quartile. The Chow test of the equality of these coefficients rejects the null hypothesis with a probability of .99. Evidently, the top quartile of funds manifests a different response pattern than the other quartiles. More interesting is the fact that the bottom quartile is not significantly different from the second and third quartiles. We cannot reject the hypothesis that the response is the same for all but the top performing funds. In other words, even controlling for survivorship, we document a differential response conditional upon past performance. We see nothing special about the coefficient on poor performance, however.

## Conclusion

Festinger's cognitive dissonance hypothesis asserts that people tend to revise their beliefs in order to reduce apparent logical contradictions. Market research has indicated that the anxiety associated with a major purchase decision such as the choice of automobile tends to induce selective consumer perception regarding information about the efficacy of their choice. We find some evidence that the same is true for the mutual fund purchase decision. Our questionnaire response from two groups of investors regarding their personal holdings and mutual fund choice suggests that even well informed investors tend to bias their perceptions regarding past performance. This positive bias does not preclude the possibility that investors confront genuine economic costs that lead to their inertia. However, to the extent that they are slow to respond to past poor performance, they may *justify* their behavior through biased beliefs about performance.

Our study of cross-sectional distribution of fund size with respect to a simple probability measure of performance exceeding treasury bill returns suggests that the number of investors in poor funds, as well as the total wealth invested in poor funds, is small. The existence of vast

numbers of irrational investors in the mutual fund industry, is contradicted by our cross-sectional evidence. Apparently, P.T. Barnum's wisdom does not extend to the mutual fund industry. The proportion of uninformed mutual fund managers seems to be greater than the proportion of naive mutual fund investors.

Why is it useful to identify psychological mutual fund investor behavior? Unlike previous researchers such as Ippolito (1992) and Sirri and Tufano (1992) we are not troubled by the fact that the market fails to discipline poor performers. In fact, our cross-sectional study of the Morningstar database indicates that the market *does* discipline lagging funds. The question remains to be answered whether the positive flow of funds into the biggest losers represents outside money or inside support. If it is outside money, we need models to explain such odd behavior, if only by a small minority. To date, the finance literature lacks useful conceptual models that describe bounded rationality, and that at the same time provide testable implications. The natural place to find such models is the social psychology literature, where behavioral patterns, rational or not, have been developed and empirically tested.

The importance of identifying cognitive dissonance in mutual fund investor behavior extends beyond the desire for models of bounded investor rationality to prescriptions to reporting requirements and mutual fund industry regulation. If new investors focus specifically upon past performance rankings, the optimal mutual fund company strategy is to greatly increase the number of funds under management, increase the volatility of individual funds, and decrease the cross-fund correlation. to the extent that the principal benefit of equity mutual funds is to provide low-cost diversification, this strategy does little to benefit mutual fund investors. The inertia caused by psychological or economic factors tempts mutual fund companies to slowly raise fees on poor performers. Fortunately, there is little evidence that this particular strategy is pursued.

The cognitive dissonance of mutual fund investors provides some positive information for mutual fund companies regarding strategic use of information. Given a high level of cognitive dissonance surrounding the choice of a mutual fund, it is likely that the principal value of print advertising by the fund will be in confirming that their current investors made a wise investment choice. While paid advertisements may not be able to strongly influence new investor decisions, they may be able to help funds retain their current customers.

**Table I**  
**Results of Questionnaire on Perceptions of Investment Manager Performance**

	Sample I	Sample II	Sample II
	Funds	Funds	Profit-Share
Estimated Return - Actual Return	0.034	8.58%	2.36%
Standard Errors	0.0232	3.38%	1.22%
Estimated Relative Return - Actual Relative Return	0.0511	4.17%	3.42%
Standard Errors	0.0227	2.49%	1.36%
Satisfaction	0.0241	4.17	5.64
Standard Errors	0.0029	0.60	0.72
Difficulty	7.08	6.22	
Standard Errors	0.0037	2.25	
Years Before Switch	2.15	2.39	
Average 3 Yr. Alpha Ranking	N/A	0.34	
Counts	57	18	11

Notes: These results are based upon responses to questionnaires described in the text. Actual returns were obtained from Morningstar inc. for individual funds. Benchmark performance figures were obtained from Ibbotson Associates. For the year 1992, they were 7.67% for the S&P 500 and 7.68% for the Merrill Lynch bond index. The benchmark for the profit-sharing account was assumed to be based upon a 50/50 mix between stocks and bonds, however over the period 1992, the results were not sensitive to manager deviations from this allocation. The probability of rejection is based upon a two-tailed t-test with unknown variances. It is reported, despite the fact that dependency across observations and deviations of variables from normality violate necessary the assumptions for the test to be correctly specified. Average 3 year alpha ranking is taken from estimates by Morningstar inc. It is based upon rankings of the CAPM alpha among funds of similar style over the three year period July, 1991 to July, 1993.

**Table II**

**Regression of dollar-valued new money on past year's new money and past year return. In the unconstrained regression, the past year return is divided into quartiles.**

$$NM_t = \alpha + \beta_1 NM_{t-1} + \beta_2 R_t + \beta_3 R_{t-1} I_1 + \beta_4 R_{t-1} I_2 + \beta_5 R_{t-1} I_3 + \beta_6 R_{t-1} I_4 + \epsilon_t$$

where  $I_k$  takes the value 1 if  $R$  is in the  $k$ th quartile, and 0 otherwise. The constrained regression requires the response to be the same for each quartile of past years returns. The Chow test indicates the probability that the quartile coefficients are not equal to each other.

Variable	Unconstrained Regression		Constrained Regression	
	Coefficient	Standard Error	Coefficient	Standard Error
	t			
1979 dummy	-16.07	6.54	-18.98	6.47
1980 dummy	-14.37	7.92	-24.33	7.35
1981 dummy	-9.93	8.58	-22.58	7.76
1982 dummy	-1.72	6.19	1.94	6.54
1983 dummy	14.87	7.39	6.55	6.93
1984 dummy	-8.02	7.01	-15.74	6.64
1985 dummy	1.25	5.77	5.80	5.61
1986 dummy	3.92	6.87	-6.72	6.14
1987 dummy	-4.26	5.41	-9.14	5.19
1988 dummy	-36.42	4.50	-34.19	4.42
1st Q Ret (t-1)	-23.11	31.62	NA	NA
2nd Q Ret(t-1)	-49.78	31.26	NA	NA
3rd Q Ret(t-1)	32.79	24.00	NA	NA
4th Q Ret(t-1)	54.87	11.91	NA	NA
Constrained Ret (t-1)	NA	NA	55.63	11.79
Statistics	R <sup>2</sup> = .025	N=4446	R <sup>2</sup> = .021	N=4446

Notes: All dummies defines as the difference between the current year and 1978.

## References

- Akerlof, G. and W. Dickens, 1982, "The Economic Consequences of Cognitive Dissonance," *American Economic Review*, 81, pp. 1-13.
- Brehm, J. 1956, "Post-Decision Changes in the Desirability of alternatives," *Journal of Abnormal and Social Psychology*, 52, 384-89.
- Britt, Stuart H., 1978, *Psychological Principles of Marketing and Consumer Behavior*, Lexington, Mass., Lexington Books.
- Brown, Goetzmann, Ibbotson and Ross, 1992, "Survivorship Bias in Performance Studies," Forthcoming *Review of Financial Studies*.
- Capon, N., G. Fitzsimmons and R. Prince, 1992, "Consumer Rationality and the Mutual Fund Purchase Decision," Columbia University Working Paper.
- Cowles, A., 1933, "Can Stock Market Forecasters Forecast?" *Econometrica*, 1, 309-325.
- Debondt, W. F. M. and R. Thaler, 1985, "Does the Stock Market Overreact?" *Journal of Finance*, 40, 793-805.
- Delong, J., Shleifer, A., Summer, L. and Waldeman, R., 1990, Noise Trade Risk in Financial Markets," *Journal of Political Economy*, 98, 703-738.
- Edwards, W., 1968, "Conservatism in Human Information Processing," In B. Kleinmuntz (Ed.), *Formal Representation of Human Judgement*. New York: Wiley, pp. 17-52. Reprinted in Kahneman, Slovic and Tversky (Eds.), 1982, *Judgement Under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press, pp.359-369.
- El-Gamal, Mahmoud and David Grether, 1993, "Uncovering Behavioral Strategies: Likelihood-Based Experimental Data Mining," Working Paper, California Institute of Technology, Pasadena.
- Elton, E., M. Gruber, S. Das and M. Hlavka, 1991, "Efficiency With Costly Information: A Reinterpretation of Evidence For Managed Portfolios," Working Paper, Leonard Stern School of Business, New York University.
- Erlich, D., Guttman, P., Schopenbach and J. Mills, 1957, "Postdecision Exposure to Relevant Information," *Journal of Abnormal and Social Psychology*, 54, January, pp. 98-102.
- Festinger, L. 1957, *A Theory of Cognitive Dissonance*, Stanford, Ca., Stanford University Press.
- Filer, R., 1952, "Frustration, Satisfaction and Other Factors Affecting the Attractiveness of Goal Objects," *Journal of Abnormal and social Psychology*, 47, 203-212.
- Goetzmann, W., B. Greenwald and G. Huberman, 1992, "Market Response to Mutual Fund

Performance," Columbia University Working Paper.

Goetzmann, W, and R. Ibbotson, 1989, "Do Winners Repeat? Patterns in Mutual Fund Performance," Yale School of Management Working Paper.

Goetzmann, W, and R. Ibbotson, 1993, "Games Mutual Funds Play," Working Paper, Columbia University Graduate School of Business.

Grinblatt, M. and S. Titman, 1988, "The Evaluation of Mutual Fund Performance: An Analysis of Monthly Returns," Working Paper, The John E. Anderson Graduate School of Management at UCLA.

Grinblatt, M and S. Titman, 1989, "Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings," *Journal of Business*, 62, 393-416.

Grinblatt, M. and S. Titman, 1992, "Performance Persistence in Mutual Funds," *Journal of Finance*, December.

Hausman, Jerry, and David Wise, 1979, "Attrition Bias in Experimental and Panel Data: The Gary Income Maintenance Experiment," *Econometrica* 47,2, pp.455-473.

Heckman, J., 1979, "Sample Selection Bias as Specification Error," *Econometrica* 47,1, pp. 153-161.

Heckman, J., 1990, "Selection Bias and Self-Selection," *The New Palgrave 'Econometrics'* Eatwell, Milgate and Newman, eds. pp. 201-224.

Hendricks, D., J. Patel and R. Zeckhauser, 1992, "Hot Hands in Mutual Funds: The Persistence of Performance, 1974-88," Forthcoming, *Journal of Finance*

Hirshleifer, D. and I. Welch, 1994, "Institutional Memory, Inertia and Impulsiveness," Working Paper, Anderson Graduate School of Management, UCLA.

Ippolito, R. ,1989, "Efficiency With Costly Information: A Study of Mutual Fund Performance," *the Quarterly Journal of Economics*,104, 1-23.

Ippolito, R, 1992, "Consumer Reaction to Measures of Poor Quality: Evidence From the Mutual Fund Industry," *Journal of Law and Economics* 35 (April), pp. 45-70.

Irwin, F. and Gebhard, M., 1943, "Studies of Object Preferences: The Effect of Ownership and Other Social Influences," *Journal of Experimental Psychology*, 33, 64-72.

Jensen, M, 1968, "The Performance of Mutual Funds in the Period 1945-1964," *The Journal of Finance*,23, 389-416.

Lehman, Bruce N. and David Modest, 1987, "Mutual Fund Performance Evaluation: A Comparison of Benchmarks and a Benchmark of Comparisons," *Journal of Finance*, 21, 233-265.

Patel, J., R. Zeckhauser and D. Hendricks, 1990, "Investment Flows and Performance: Evidence from Mutual Funds, Cross Border Investments and New Issues," Harvard University Working Paper.

Patel, J and R. Zeckhauser, 1992 "Survivorship and the 'U' Shaped Pattern of Response" . Working Paper, John F. Kennedy School.

Samuelson, W. and Zeckhauser, R., 1988, "Status quo Bias in Decision-Making," *Journal of Risk and Uncertainty* 1,7-59.

Shiller, R., 1984, "Stock Prices and Social Dynamics," *Brookings Papers on Economic Activity*, Brookings Institute, pp. 457-498.

Sirri, E., and P. Tufano, 1992, "The Demand For Mutual Fund Services by Individual Investors," Harvard Business School Working Paper.

Thaler,R., 1980, "The Ultimatum Game," *Journal of Economic Perspectives* 2, Fall, 195-206.

Thaler, R., 1992, *The Winner's Curse: Paradoxes and Anomalies of Economic Life*. New York: The Free Press, 1992.

Thaler, R., Kahneman, D. and Knetsch, J. "The Endowment Effect, Loss Aversion and Status Quo Bias," in Thaler, R., 1992, *The Winner's Curse: Paradoxes and Anomalies of Economic Life*. New York: The Free Press, 1992.

Weisenberger Investment Companies, 1977 through 1989, *Investment Companies*, Weisenberger Investment Companies.

## Notes

1. See Britt, Steuert H., 1978, *Psychological Principles of Marketing and Consumer Behavior*, Lexington, Mass.: Lexington Books for a survey of the application of the theory of cognitive dissonance in marketing research.
2. A notable exception is Shiller's (1988) survey of institutional investor beliefs about the 1987 crash. Another tack has been taken by Hirshleifer and Welch (1994), that is, direct modelling of the cognitive processes of decision-making conditional upon institutional and individual memory.
3. Early researchers into cognitive dissonance behavior recognized the difficulty of rejecting the endowment effect alternative. For instance, Brehm (1956) explicitly controlled for an endowment effect in his experimental study of post-decision changes in the desirability of alternatives. He found, as did previous researchers, some evidence of an endowment effect, but concluded that changes in beliefs and information evaluation by his subjects were, none-the-less, strongly conditioned upon the active choice decision.
4. The profit-sharing plan has retained a money manager who maintains a 50/50 balance between stocks and bonds. The investment results are reported annually to the beneficiaries. Additional information about the securities held by the plan, as well as the management fees is available upon request by mail.
5. The benchmark was the S&P 500 for equity funds, the Shearson Bond Index for bond funds, and an appropriate percentage mixture between the two for the profit-sharing plan.
6. The assumption is that they disclosed both their poor choices as well as their good choices. While censorship is a possibility, it does not obviously bias the results of the questionnaire.
7. Of sixty forms circulated, 12 individuals responded to the questionnaire. The 29 investments were held by these 12 people.
8. Under the assumption that the time series' of returns to the fund are independent, identically distributed and approximately normal, and that the riskless rate is constant, we may form a Z statistic indicating the probability that the fund return is greater than the riskless rate as:

$$Z \equiv \frac{R_{fund} - R_{t-bill}}{\frac{\sigma_{fund}}{\sqrt{N}}}$$

Where  $R_{fund}$  is the historical arithmetic average of the fund return over N periods,  $R_{t-bill}$  is the t-bill return over the same period, and  $\sigma$  is the sample standard deviation of the fund return.

9. In fact, simulations of the "U" shaped pattern indicate that is more correctly described as "J" shaped, and is characterized by large standard errors in the left tail.

10. The database is collected from the Weisenberger Investment Companies Service *Investment Companies* annual reports. It provides information about virtually all publicly offered open-end mutual funds on an annual basis. Data were collected by hand from the *Mutual Funds Panorama* section for the years 1976 through 1988, for all firms listed as common stock funds, or those specialty funds that invested in common stock (typically sector funds). For each fund, we recorded the name as it appeared that year, the year of origin, the fund objective, the net asset value at the end of the year, the net asset value per share at the beginning of the period, the 12 month percentage change in net asset value per share adjusted for capital gains distributions, the income return, the capital gains distributions and the expense ratio. We calculated the total return inclusive of capital appreciation, income and capital gains distributions. In some cases, one or more of these data were not reported, and this prevented total return calculations. We calculated net fund inflows, "new money," as the total fund value at time  $t$  less the total fund value at time  $t-1$  times the total fund return over the period, adjusted for capital gains. This makes the conservative assumption that fund investors automatically re-invest dividends. In order to track funds through time, we assigned each a unique number. Footnotes at the end of the *Panorama* section indicated merged funds and name changes of funds. When one fund was merged into another, the "acquired" fund was deemed to have disappeared, while the "acquiring" fund was deemed to have continued in operation. For additional details about the database, see Brown and Goetzmann (1992).