

Coarse Thinking and Persuasion

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Abstract

We present a model of coarse thinking, in which individuals group situations into categories, and transfer information from situations in a category where it is useful to situations where it is not. The model explains how uninformative messages can be persuasive, particularly in low involvement situations, and how objectively informative messages can be dropped by the persuader without the audience assuming the worst. The model sheds light on several aspects of mutual fund advertising.

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Introduction

In most societies, a tremendous amount of resources is devoted to persuasion (McCloskey and Klamer 1995). Selling, advertising, political campaigns, organized religion, law, much of the media, and good parts of education are devoted to changing beliefs in a way advantageous to the persuader. Moreover, persuasion is not simply about expending resources: the exact content of the message crucially shapes its effectiveness². But what constitutes persuasive content?

Economists typically assume that only one type of persuasive content matters: objectively useful information. Stigler (1987, p. 243), for example, writes that “advertising may be defined as the provision of information about the availability and quality of a commodity.” Economists have typically modeled persuasion, including advertising (Stigler 1961), political campaigns (Downs 1957), or legal argument (Milgrom and Roberts 1986, Dewatripont and Tirole 1999) as provision of information. In some frameworks, such as Grossman (1981), Grossman and Hart (1980), Milgrom (1981), and Okuno-Fujiwara et al. (1990), the persuader uses information strategically, but he conveys information nonetheless³.

Psychologists understand persuasion quite differently. They argue that people evaluate various propositions or objects using representativeness, metaphors, analogies, and more generally associative strategies (Tversky and Kahneman 1982, Lakoff 1987, Edelman 1992, Zaltman 1997). Associations play a central role in our approach. There are two ways associations may operate, what one might call associative thinking and

² Bertrand et al. (2006) present some clear evidence that persuasive content matters in a field experiment using loan advertisements by a South African consumer lending institution.

³ Recent years saw a revival of research on communication and persuasion from the information-theoretic perspective. See, e.g., Glazer and Rubinstein (2001, 2004).

associative feeling. Associative thinking is transference of information from one context to another. When a message has some connotation in one context, a person may take it to have a similar connotation in a related context (even if it does not). This kind of association operates through a cognitive process. Associative feeling, on the other hand, reflects an emotional response to some messages. This response may be a quick and dirty aggregator of many associations summarized in a message. Persuasion can surely take advantage of both types of association, but here we focus on the cognitive channel.

To motivate our analysis, consider four persuasive messages:

Alberto Culver Natural Silk Shampoo was advertised with a slogan “We put silk in the bottle.” The shampoo actually contained some silk. Nonetheless, during the campaign, the company spokesman conceded that “silk doesn’t really do anything for hair” (Carpenter, Glazer and Nakamoto 1994).

A successful television and print advertising campaign for American Express Travelers Checks featured Karl Malden, an actor who played a detective on the television show “The Streets of San Francisco.” The ads advised the audience that, for safety, they should carry American Express Travelers Checks rather than cash.

After the crash of the internet bubble, the brokerage firm Charles Schwab launched an advertising campaign that featured judges, ship captains, crossing guards, doctors, grandmothers, and other steady and reliable individuals, each standing next to a Schwab investment specialist. The headline of one ad, depicting a Schwab professional standing next to a pediatrician, stated that “Both are seen as pillars of trust.”

As an example from political persuasion, consider Arnold Schwarzenegger’s memorable speech at the 2004 Republican National Convention. In the best remembered

part of his speech, Schwarzenegger defended free trade: “To those critics who are so pessimistic about our economy, I say: Don’t be economic girlie men!... Now they say India and China are overtaking us. Don’t you believe it. We may hit a few bumps – but America always moves ahead. That’s what Americans do.”

What do these persuasive messages have in common? They all appear to have the feature that a piece of information that has some objective value in one context gets transferred by the persuader into another context, where it has limited or no value. A piece of data that might carry objective weight in one situation is brought to bear on another, where it is uninformative.

In the Alberto Culver example, the audience knows that silky hair is attractive. And although silk does nothing for hair, this ad rests on the audience’s perception that it will make hair attractive. The audience is expected to apply the information (silkeness) useful in one context (hair) to another context (shampoo), where it is useless.

In the American Express example, the audience, many of whose members have watched “The Streets of San Francisco,” know that Karl Malden keeps people safe. The ads seek to convince them that the travelers’ checks recommended by Karl Malden will do likewise. The ad is based on the idea that the streets of San Francisco and travelers checks are both things Malden makes safe. The information (Karl Malden is involved) that is useful in one context (an episode of a television show) for predicting safety is being transferred to another context (travelers checks), where it is objectively useless. For how can it matter objectively which actor endorses travelers’ checks?

The Schwab ads take advantage of the belief that people in some positions – judges, pediatricians, grandmothers – are both trustworthy and wise. The ads hope that

this information (trustworthiness), which from the general experience of the readers is a good description of some types of professionals (judges and pediatricians), rubs off on its investment professionals as well, where the proposition is not as self-evident.

Schwarzenegger taps into a common conceptualization of foreign trade as a contest or even war. His audience undoubtedly finds the information (America always moves ahead) as plausible for a contest, especially coming from a former champion. Accepting that trade is a contest, Schwarzenegger invites the audience to transfer the information that Americans typically win into that context. Of course, both the contest analogy and the winning message are largely irrelevant for the assessment of whether free trade, outsourcing, or globalization is beneficial to the public.

Schwarzenegger's speech was not accidental. In his advice to Congressional candidates, the Republican political strategist Frank Luntz (2006) writes: "Never, never, never begin a response to outsourcing by saying it is beneficial to the U.S. economy. Never... Don't talk like economists. Words like 'protectionist,' 'capitalist,' and 'isolationist' turn the average voter off. The key word is winning. It is essential that you capture the theme of winning and insert it into all your communications efforts."

The transfer of data that is informative in one context into another, where it might not be, is obviously related to associational, analogical, or metaphoric thinking, all of which have been discussed by psychologists (e.g., Lakoff 1987, Zaltman 1997). Importantly, such thinking is both common and extremely useful in everyday life because it reduces the evaluation of new situations to comparison with familiar ones. Some writers think that, for this reason, our brains have evolved so as to make metaphor and analogy standard hard-wired forms of reasoning (Edelman 1992). Of course, the patterns

of thought that are *usually* extremely helpful are not *always* so. We suggest that persuaders take advantage of people utilizing a strategy which, though useful in “similar” contexts, may or may not be useful in the situation of interest to the persuader.

To this end, we present a model of persuasion that deviates from Bayesian rationality in one key way. We assume that people put situations into categories, and failing to differentiate between co-categorized situations, use one model for all the situations in the same category. We refer to such inference as coarse thinking. Coarse thinking implies transference: the impact of a message in one situation depends on how that message is interpreted in other co-categorized situations. Persuasion takes advantage of coarse thinking.

The model yields several implications. First, it shows how messages that are non-informative in a given situation nonetheless affect beliefs, and delineates the contexts in which they do so more effectively. Second, it demonstrates the effects of increasing the sophistication of the audience on the efficacy of non-informative persuasion. The recognition by the audience that the persuader is acting strategically reduces, but does not eliminate, the scope for non-informative persuasion. Third, with coarse thinking, the persuader can get away with concealing payoff-relevant information without his audience assuming the worst. This result gets us away from the full revelation conclusions of, for example, Grossman-Hart (1980) or Milgrom (1981). On the other hand, if the audience is fully Bayesian and treats each situation differentially – does not engage on coarse thinking – the possibility of uninformative persuasion disappears, at least in our model.

Economists have struggled with the realization that much of persuasion is not informative for many years. A perceptive early contribution is Tullock (1967). Posner

(1995) draws a sharp distinction between persuasion (rhetoric) and provision of information, and discusses Aristotle's and Plato's ideas on the subject. More recent research includes studies of hatred (Glaeser 2005), media (Mullainathan and Shleifer 2002, 2005, Gentzkow and Shapiro 2006, Della Vigna 2007), and political persuasion (Becker 2001, Murphy and Shleifer 2004, Glaeser, Ponzetto, and Shapiro 2005).

Perhaps the largest literature looking at persuasion focuses on advertising. Nelson's (1974) classic study tried to broaden the range of what might be seen as informative advertising. Stigler and Becker (1977) and Becker and Murphy (1993) examine models in which advertising enters the utility function directly. Some recent studies, such as Gabaix and Laibson (2006) and Shapiro (2006), offer explicitly behavioral models of advertising. As far as we know, however, our paper is the first to study persuasion in a model of associative thinking so central to psychological work.

We develop our analysis in three steps. In Section 2, we present a model of inference and persuasion for both Bayesian and coarse thinkers. We show how this model can account for the examples we have described, as well as more generally for the creation of objectively uninformative messages by persuaders. This is the case regardless of whether the audience understands that the persuader is acting strategically. In Section 3, we ask whether persuaders can get away with dropping informative messages. Again, with coarse thinkers, the answer is yes, even if they understand that the persuader is acting strategically. In Section 4, we apply the analysis to the advertisement of mutual funds, and show that the stylized facts about such advertisement are consistent with the predictions of the model. Section 5 concludes.

2. Uninformative Messages

Basic setup

In this section, we show that persuaders may pay to create *uninformative* messages. An individual must assess the quality of a given object, such as a shampoo, a mutual fund, or a political candidate. We denote this underlying quality of the object by $q \in (-\infty, \infty)$. The individual receives a potentially informative message $m \in \{b, g\}$ about q . He then uses this message to form expectations about underlying quality.

The individual faces two similar, but not identical, situations $s \in \{0, 1\}$. Absent persuasion, the underlying joint distribution of quality, messages and situations is $p(m, q, s)$. We make several assumptions about this joint distribution. First, we assume that the distribution of quality conditional on the situation is the same across situations: $p(q|s=0) = p(q|s=1) = p(q)$. Second, we assume that $p(q)$ is such that the expected quality is zero: $E^B[q|s=0] = E^B[q|s=1] = E^B[q] = 0$, where superscript B denotes the rational (Bayesian) expectation.

A key feature of our model is that messages are informative in one situation (situation 1) but not in the other (situation 0). Specifically, the conditional distributions $p(q|m = b, s = 1)$ and $p(q|m = g, s = 1)$ are such that $E^B(q|m=b, s=1) < E^B(q|m=g, s=1)$. That is, in $s = 1$, the message g reflects good news and b reflects bad news. Note that.

$$E^B(q | m = b, s = 1) = -E^B(q | m = g, s = 1) \frac{p(m = g | s = 1)}{p(m = b | s = 1)} \quad (1)$$

In contrast, we assume that these messages are uninformative in situation $s=0$, i.e., $p(q|m=g, s = 0) = p(q|m = b, s = 0) = p(q|s = 0) = p(q)$ for all q . The Bayesian expectation of quality in situation 0 given message m is then:

$$E^B(q | m = g, s = 0) = E^B(q | m = b, s = 0) = E^B(q | s = 0) = 0 \quad (2)$$

The “silk in the bottle” example from the introduction can be understood in this setup. One situation would be a consumer looking for shampoo, where the message g would be “We put silk in the bottle.” The message b can be some neutral or null message.⁴ In this situation, $g = \text{“silky”}$ and $s = \text{“shampoo.”}$ In another situation, the consumer may be assessing quality of hair. In this case the consumer might encounter a message “Her hair is silky,” which would be informative. In that situation, $g = \text{“silky”}$ and $s = \text{“hair.”}$ In this example, the same message (“silky”) is uninformative in the first situation but informative in the second.

A Bayesian thinker is able to distinguish among the different situations s he faces, and therefore to update his beliefs correctly for each situation. In the silk example, a Bayesian uses a different model for each situation, and therefore correctly infers that silk raises the probability that hair is of high quality, but does not change that probability for a shampoo. Such a Bayesian simply ignores the shampoo ad.

⁴ In the formal model, the message b denotes a bad signal. Here also the neutral message would also imply a negative update (relative to no news) since it indicates the absence of good news.

Coarse Beliefs

The essential assumption in our model is that individuals do not have separate mental representations for every situation. Instead, they have only one representation for all the situations in a category and are effectively unable to differentiate between these situations. For example, they might interpret silkiness in a similar way for shampoo as for hair, or think of winning in the same way in sports as in foreign trade. Categorical thinking has been previously modeled by Mullainathan (2000), Mullainathan and Shleifer (2002), Fryer and Jackson (2004), and Peski (2006); our framework relies most closely on the ideas in Mullainathan (2000).

Specifically, we assume that individuals group situation $s = 0$ and $s = 1$ together into the same category. Upon receiving the message m , the coarse thinker updates as a Bayesian who observes the category he is in but not the specific situation. Such a thinker, for each situations $s = 0, 1$, derives the joint distribution

$$p^c(q | m, s) = p(q | m, s = 0)p(s = 0 | m) + p(q | m, s = 1)p(s = 1 | m) \quad (3)$$

Individuals respond not to the actual informativeness of a message in the current situation s , but rather to a weighted average of its informativeness across all situations co-categorized with s . The coarse thinker weighs the informativeness of the message in situation s by the likelihood of that situation in the category given that the message is m : $p(s|m)$. This would, for example, be the updating rule of a frequentist who receives data from both situations but ignores which situation generated the data⁵.

The coarse thinker's updating rule implies that, upon observing message m , her revised expectation of quality is:

⁵ Our results also go through if the coarse thinker is even more naïve (or coarse), and does not condition the weights of different situations on the message; i.e, he uses $p(s=0)$ and $p(s=1)$ as weights.

$$\begin{aligned}
E^C(q | m, s) &= E^B(q | m, s = 0)p(s = 0 | m) + E^B(q | m, s = 1)p(s = 1 | m) \\
&= E^B(q | m, s = 1)p(s = 1 | m) \\
&= \begin{cases} E^B(q | m = g, s = 1) \frac{p(m = g | s = 1)}{p(m = g)} p(s = 1) & \text{if } m = g \\ -E^B(q | m = g, s = 1) \frac{p(m = g | s = 1)}{p(m = b)} p(s = 1) & \text{if } m = b \end{cases}
\end{aligned} \tag{4}$$

In expression (4), the second to last equality takes into account the fact that that $E^B(q | m, s = 0) = 0$ for all m . Coarseness implies that updating happens as if the person cannot distinguish the various situations in a particular category. When individuals form categories that include only one situation, their behavior is identical to that of a Bayesian.

As shown by Mullainathan (2000), this model produces empirically plausible patterns of under- and over-reaction. By comparing the updating rules, we can see which messages are under- or over-responded to by a coarse thinker relative to the Bayesian one. To do this, recall that

$$E^C(q | m, s) = E^B(q | m, s = 0)p(s = 0 | m) + E^B(q | m, s = 1)p(s = 1 | m) \tag{5}$$

Comparing this to the Bayesian's response $E^B(q | m, s)$ suggests two distortions. First, since $p(s | m) \leq 1$, the response of the coarse thinker only mutedly depends on how informative that message m is for situation s itself, as measured by $E^B(q | m, s)$. This effect can lead to an under-reaction to news. Take, for example, the case where $E^B(q | m, s) > 0$ and $E^B(q | m, s') = 0$ for s' . We see here that $E^C(q | m, s) \leq E^B(q | m, s)$. Coarse thinking leads to an under-response to news relative to the Bayesian. The uninformativeness of the message in other situations dilutes its impact in situation s , precisely because the current situation is under-weighted in the update rule.

Second, the response of the coarse thinker also depends on a term that the Bayesian's response does not depend on: the informativeness of the message in the other situation s' in the same category. This implies that the coarse thinker could react to non-information or over-react to information. Take the case, for example, where $E^B(q|m,s) = 0$, so the message is uninformative in situation s , but is informative in the other co-categorized situation ($E^B(q|m,s') > 0$). Then, $E^C(q|m,s) \geq E^B(q|m,s)$. The coarse thinker is now reacting to a piece of data uninformative in situation s because it is informative in other situations in the same category. His use of the same model to interpret messages in all situations leads him to over-react to non-informative data. This, we suggest, is what a person responding to silk in shampoo, or to Karl Malden's travelers' checks, is doing. This transference of information across situations drives our results below. Indeed, the strategy of persuasion is to trigger such transference: successful persuasion in our model takes advantage of over-reaction.

The perspective on over-reaction used in this model is similar to that used in some recent research in finance, which discusses stock price movements in response to non-information. Daniel and Titman (2006) suggest that over-pricing of some growth stocks is best understood as an over-reaction to non-fundamental "intangible" information, which is subsequently reversed. Analytically, our view of over-reaction as an unjustified response to news about items within the same category is distinct from the interpretation of over-reaction in Mullainathan (2000) and Mullainathan-Shleifer (2002), which look at it in terms of category change. The perspective here is much closer to the finance perspective, which talks about stock price moves unjustified by fundamental news.

As this discussion makes clear, our results rely crucially on assumptions as to which situations belong together in a category. This raises a question: what determines categories? We take such categorizations to be exogenous and fixed. People already bear in mind that judges and grandmothers are trustworthy. Indeed, the perspective that people already have systems of mental categories and associations that the advertiser needs to tap into is not unusual (see, e.g., Zaltman 1997, Rapaille 2006).

More generally, a situation can be part of several categories, and these categories may change over time and place. Depending on which product attribute the persuader wants to stress, he will rely on different categorization. Mullainathan and Shleifer (2006) suggest along these lines that individuals co-categorize investing with other activities that make you *free to* do things when stock prices are rising rapidly, but with protection and activities that keep you *free from* adversity in more normal circumstances. Advertisers of mutual funds accordingly use images of wealth when stock prices are rising, and of security when they are falling. Moreover, some members of categories are more central (prototypical) than others, so agents who reason categorically do not treat them symmetrically. Football is a more prototypical example of a contest than international trade. Last but not least, persuasion itself can create or shape categories. For decades, the Avis car rental company advertised as “We are number two (to Hertz). We try harder.” The campaign relied on the general category of underdogs, but suggested in the area where it was probably not used previously⁶. All these issues of category determination are extremely important, but are not considered in the model.

⁶ Along these lines, Aragonés et al (2001) study persuasion as re-organization of available data. In our model, if messages create categories then the set of co-categorized situations becomes $C(s,m)$ rather than $C(s)$, and the analysis becomes correspondingly more complex.

Persuasion (face value)

The persuader in situation $s = 0$ maximizes the individual's expected quality, net of persuasion costs. Presumably, the higher the expected quality, the greater the support the persuader receives, whether through sales, votes, or membership in his organization.⁷ The persuader can alter messages. Specifically we assume that the persuader observes the signal m that the individual would see absent intervention (for example, if the shampoo appears on a store shelf without advertising). He can then either intervene prior to the individual's observing m and create an altered message $m' \in \{g, b\}$ not equal to m at cost c , or simply report $m' = m$ at zero cost. The individual then observes m' and never sees the original m . We assume that the persuader in situation $s = 0$ can create an altered message since m is uninformative in $s = 0$.

The persuader's strategy is determined by how individuals respond to the messages. In this subsection, we make the *face value assumption*, namely that individuals, including both Bayesians and coarse thinkers, take the message m' they see and update as if it were the original message. In other words, they do not make the extra inference that, if they see m' , it tells them that the original message might have been a different m . In the next subsection, we allow for strategic inference by the individual, and show that the results presented in this section are largely robust to it. The persuader's payoff, which he is assumed to maximize, is given by:

$$\begin{aligned} E(q | m', s) - c & \text{ if } m' \neq m \\ E(q | m', s) & \text{ if } m' = m \end{aligned} \tag{6}$$

⁷ In a Bayesian framework, Holden and Kamenica (2006) examine persuasion where the objective is to change the consumer's decision rather than his beliefs about the state of the world.

The persuader's payoff when individuals are face value coarse thinkers is mathematically equivalent to his payoff in an alternative setup where individuals are face value Bayesians, but the persuader observes the situation s while his audience does not. However, the two setups have very different interpretations. In the coarse thinking setup, individuals observe the situation they are in, but use the same model to interpret messages in co-categorized situations. In the asymmetric information setup, individuals have distinct models for the two situations, but do not observe which situation they are in.

Proposition 1: Suppose individuals are face value Bayesians and messages are uninformative in situation $s = 0$. Then the optimal strategy of the persuader in situation $s = 0$ is to always report m and to never pay the cost to replace m with another message.

Proof:

For an audience of face value Bayesians, the persuader never pays the cost to create an uninformative signal and simply reports the truth. To understand why, first note that the persuader would never optimally choose to alter the message $m = g$ since it is the most positive message available. Additionally, he would never pay the cost to alter the message $m = b$ and replace it with $m' = g$ for face value Bayesians since the payoff if he reports $m = b$ is $E^B(q|m' = b, s = 0) = 0$ which is greater than the payoff if he replaces $m = b$ with $m' = g$: $E^B(q|m' = g, s = 0) - c = -c < 0$. ♦

The face value coarse thinker, on the other hand, is vulnerable to persuasion:

Proposition 2: Suppose individuals are face value coarse thinkers and messages are uninformative in situation $s = 0$. Then the optimal strategy of the persuader in situation $s = 0$ may involve creation of a message. Specifically, the persuader's optimal strategy dictates replacing $m = b$ with $m' = g$ if

$$c < E^B(q | m = g, s = 1)p(m = g | s = 1)p(s = 1) \left(\frac{1}{p(m = b)p(m = g)} \right) \quad (7)$$

$$\equiv c^*.$$

Proof:

To understand this result, note that if the persuader reports $m = b$ to a face value coarse

thinker, his payoff is: $E^C(q | m = b, s) = -E^B(q | m = g, s = 1) \frac{p(m = g | s = 1)}{p(m = b)} p(s = 1)$. If he replaces $m =$

b with $m = g$, his payoff is $E^C(q | m = g, s) - c = E^B(q | m = g, s = 1) \frac{p(m = g | s = 1)}{p(m = g)} p(s = 1) - c$.

Putting the two together, the persuader replaces if this difference is positive or, equivalently, if $c < c^*$. ♦

Condition (7) yields a corollary:

Corollary 1: Suppose individuals are face value coarse thinkers and let c^* be the upper bound on the cost of fabrication for which it is optimal for the persuader in situation $s = 0$ to replace $m = b$ with $m = g$. Then, c^* is increasing in (i) the probability of situation 1, $p(s = 1)$ and (ii) the informativeness of message g in $s = 1$, $E^B(q | m = g, s = 1)$.

According to Proposition 1, persuaders never manufacture messages for face-value Bayesians. Because messages in situation $s = 0$ are assumed to be uninformative,

Bayesians – unlike coarse thinkers – do not update their beliefs from them. Persuaders may, however, manufacture messages for coarse thinkers. Their decision depends on whether the gap (in terms of the improved assessment of quality) between the best possible message and the true message is big enough to offset the cost of persuasion.

Corollary 1 highlights the fact that, with two co-categorized situations, persuaders are more likely to manufacture a message in the situation s that has a lower probability within its category. Since the motive for doing so is the transference of information from other situations in a category to the current one, a higher probability of these other situations increases transference and therefore the benefit from manufacturing messages.

This point is closely related to what advertisers refer to as consumer involvement, a notion closely related to but not identical to that of stakes (Bernartzi and Thaler 2006). A high involvement product occupies a huge probability space in its category ($p(s = \theta)$ is high), so the transference from other situations is small, and hence so is the benefit of non-informative advertising. Our model predicts, as the marketing research recommends, that advertising in these instances should be informative (Sutherland and Sylvester 2000). In contrast, low involvement products are mixed up in consumers' minds with many similar situations and hence there is greater scope for persuasion, exactly as the marketing literature suggests. Silk in shampoo, American Express travelers' checks, and Schwarzenegger's defense of free trade are all consistent with this point. Voting may be another low involvement activity, which encourages non-informative advertising. Our point is *not* the view that people are incapable of rational high involvement thinking, but rather that in many instances they do not engage in such thinking, perhaps because it is not worth it. It is precisely in those instances of coarse thinking that persuasion pays.

Persuasion (sophisticated)

So far we have assumed that individuals take information at face value. Sophisticated individuals, however, make inferences from the observed message about what the underlying information of the persuader must have been, recognizing that he is a rational wealth maximizer. We now ask how the recognition of strategic behavior influences inference about the true state of affairs.

Suppose that the persuader operates according to a strategy that dictates replacing the message m with message m' with probability $\phi(m, m')$. We assume that individuals know this strategy and update their expectations of quality accordingly.

Define $p_\phi(m | s, m') = \frac{p(m | s)\phi(m, m')}{p(m | s)\phi(m, m') + p(m' | s)\phi(m', m')}$ to be the probability of

message m when the audience observes message m' and the persuader's strategy is $\phi(m, m')$. A Bayesian in this case updates his assessment of quality according to:

$$p^{SB}(q | m', s) = p_\phi(g | m', s)p(q | g, s) + p_\phi(b | m', s)p(q | b, s) \quad (8)$$

implying that his revised expectation of quality is:

$$E^{SB}(q | m', s) = p_\phi(g | m', s)E^B(q | g, s) + p_\phi(b | m', s)E^B(q | b, s) \quad (9)$$

The coarse thinker has a more complicated updating rule. He makes inferences about quality based on the strategies of persuaders in the whole category, rather than based solely on the strategy of the persuader in the particular situation. Define $p_\phi(s | m)$ to be the probability the coarse thinker assigns to being in situation s given that he observes message m . He then updates his assessment of quality according to:

$$p^{SC}_\phi(q | m', s) = p^{SB}(q | m', s = 0)p_\phi(s = 0 | m') + p^{SB}(q | m', s = 1)p_\phi(s = 1 | m') \quad (10)$$

implying that his revised expectation of quality is:

$$E^{SC}(q | m', s) = E^{SB}(q | m', s=0)p_{\phi}(s=0 | m') + E^{SB}(q | m', s=1)p_{\phi}(s=1 | m') \quad (11)$$

As before, we assume that the persuader maximizes (6). The equilibrium concept we use is sequential equilibrium (Kreps and Wilson 1982). Our next results describe the effectiveness of persuasion against sophisticated Bayesians and coarse thinkers.

Proposition 3: Suppose that individuals are sophisticated Bayesians and that messages are uninformative in situation $s = 0$. Then, in the unique equilibrium, the optimal strategy of the persuader in situation $s = 0$ is to always report m and to never pay the cost to replace m with m' .

Proof: See appendix. ♦

Proposition 4: Suppose individuals are sophisticated coarse thinkers, that messages are uninformative in situation $s = 0$, and that the persuader in situation $s = 1$ always tells the truth. Then, whenever $c < c^*$, it cannot be optimal for the persuader in situation $s = 0$ to always tell the truth: in any equilibrium, the persuader replaces $m = b$ with $m' = g$ with some positive probability, but this probability might be less than one.

Proof: See appendix. ♦

Proposition 4 shows that sophistication does not eliminate the advantage of uninformative persuasion for coarse thinkers. The cost threshold c^* is the same as in the face-value case. In contrast to the face value case, however, when condition (7) holds, the equilibrium probability that the persuader replaces $m = b$ with $m' = g$ may be less

than one. While sophistication, as opposed to belief in the face value of the message, might render persuasion less effective and therefore less likely to be used at a given level of cost, it does not eliminate the incentive to manufacture uninformative data. Proposition 4 shows that persuasion is primarily a consequence of coarse thinking and not of the failure to understand the strategic motive of the persuader. The face value assumption simplifies our results, but it is not critical.

3. Informative Messages

Face Value

In Section 2, we considered the case where messages are uninformative in situation 0 and informative in situation 1. This assumption enabled us to examine when uninformative messages might be created by the persuader. It is also interesting to ask when informative messages, such as mutual fund fees, can be dropped⁸. This question is most naturally considered in a situation where persuaders cannot fabricate messages, as they did in Section 2, perhaps because such deception (e.g., about fees) is illegal.

To examine this question, we consider the case where messages are informative in both situations, i.e., $p(q|m, s = 0) = p(q|m, s = 1)$ for all q, m , where $p(q|m, s = 1)$ is as specified in Section 2. In addition, we expand the set of possible messages to include the empty message, \emptyset , and assume that the empty message is in general uninformative:

$$p(q | \emptyset, s) = p(q | s) \tag{12}$$

for all q and $s = 0, 1$.

⁸ Gabaix and Laibson (2006) show that firms might choose to suppress information (such as the cost of add-ons) in the presence of naïve consumers. See also the discussion in Ellison (2005). Eyster and Rabin (2005) show that when individuals do not fully appreciate how much other peoples' actions are correlated with their types, people may successfully hide negative information in equilibrium.

To get clear results, we make two strong assumptions. First, we assume that the empty message occurs naturally in situation $s = 1$, but not in $s = 0$. In other words, $p(\emptyset|s = 0) = 0$ and $p(\emptyset|s = 1) \neq 0$. Second, to capture the idea that persuaders cannot lie about easily verifiable facts without consequence, we assume that, since messages are informative, the persuader can never change a message in situation $s = 0$, but only drop it, i.e., costlessly replace it with the empty message, \emptyset . An advertiser of athletic shoes can omit the information about their price from the ads, but he cannot lie about it.

Consider the optimal strategy of the persuader when individuals take messages at face value, be they Bayesian or coarse thinkers.

Proposition 5: Suppose individuals are face value Bayesians or face value coarse thinkers and messages are informative in situation $s = 0$. Then the optimal strategy of the persuader in situation $s = 0$ is to replace $m = b$ with $m = \emptyset$, and report $m = g$ truthfully.

Proof:

The persuader has only two options when facing message $m \in \{g, b\}$: report m or replace m with \emptyset at zero cost. In making his decision, the persuader compares his payoff from reporting m , $E(q|m, s)$, with the payoff from dropping m , $E(q|m = \emptyset, s) = 0$. When individuals are face value Bayesians, the persuader in situation $s = 0$ chooses to drop m whenever $m = b$ since $E^B(q|m = b, s = 0) < 0 = E^B(q|m = \emptyset, s = 0)$. Likewise, when individuals are face value coarse thinkers, the persuader in situation $s = 0$ chooses to drop m whenever $m = b$ since $E^C(q|m = b, s = 0) < 0 = E^C(q|m = \emptyset, s = 0)$. On the other hand, the persuader chooses to report $m = g$ in either case since this message is positive.♦

Sophistication

Now we examine the effects of sophistication. To simplify the analysis, we assume that, when the persuader is indifferent between dropping and not dropping a message, he chooses to not drop it. Again, the equilibrium concept we utilize is sequential equilibrium. The following propositions summarize the results:

Proposition 6: Suppose that individuals are sophisticated Bayesians, that messages are informative in situation $s = 0$, and that $p(\emptyset|s = 0) = 0$. Then, in the unique equilibrium, the persuader does not drop any messages.⁹

Proof: See appendix. ♦

Proposition 7: Suppose that individuals are sophisticated coarse thinkers, that messages are informative in situation $s = 0$, that the persuader in situation $s = 1$ is telling the truth, and that $p(\emptyset|s = 0) = 0$ but $p(\emptyset|s = 1) \neq 0$. Then, in the unique equilibrium, the persuader drops message $m = b$ with probability 1.¹⁰

Proof: See appendix. ♦

⁹ The uniqueness of the equilibrium hinges on our assumption that, when indifferent between dropping and not dropping a message, the persuader chooses not to drop it. When this assumption is relaxed, there are also equilibria under which the persuader drops the bad message with positive probability (and always truthfully reports the good message). In these equilibria, the persuader is indifferent between dropping and not dropping the bad message since the audience updates in the same way when viewing the empty message as when viewing the bad one.

¹⁰ The result that the persuader always drops bad messages with probability one when individuals are sophisticated coarse thinkers is an artifact of the assumptions that there is no cost to dropping messages and that there is only one negative message. When there is a positive cost to dropping messages or when there are several different negative messages (some less negative than others), then the persuader may drop some of the negative messages with probability less than one in equilibrium. However, unlike when individuals are sophisticated Bayesians, the empty message will always be viewed as a less negative signal than the most negative message when individuals are sophisticated coarse thinkers.

Proposition 6 illustrates the central feature of the traditional economics of persuasion with sophisticated Bayesian consumers. In this case, firms face only one avenue for persuasion: full provision of all available information; they cannot use non-information to persuade. Our result replicates the standard Grossman/Hart (1980) – Grossman (1981) – Milgrom (1981) result that, with sophisticated Bayesian thinkers it does not pay the persuader to drop messages when the probability of the empty message is zero since, when messages are absent, the audience assumes the worst.

On the other hand, Proposition 7 highlights the fact that, even when the probability of the empty message is zero in a situation, there may still be room for selective dropping of information when the audience consists of sophisticated coarse thinkers. In particular, Proposition 7 demonstrates that when the probability of the empty message is non-zero in a co-categorized situation, it pays for the persuader to drop negative messages. Unlike the sophisticated Bayesian, the sophisticated coarse thinker places some weight on the message being naturally absent.

4. Application: Mutual Funds

We now apply our model to mutual fund advertising. Suppose that coarse thinking individuals do not sufficiently differentiate between choosing a mutual fund and selecting other professional advisors, such as doctors or lawyers. Specifically, individuals face two types of situations in selecting professional help: choosing a mutual fund (to help with investments) and choosing another professional service.

The different types of messages that the individual might see are as follows. First, he might see information about past performance. For a mutual fund, this could be the

return on the fund in the previous year. For another professional service, this could be the history of success of a particular surgery or type of lawsuit. Past performance is hard information that cannot be altered, only dropped. Crucially, we suppose that, for other services, past performance information is sometimes simply unavailable. Second, the individual might see information about the fee for the service. For mutual funds, this is a composite of loads and all fees charged by the fund. For another professional service, this information is its price. Like past performance, fees are hard information, which cannot be altered, only dropped. Again, we suppose that, in some instances, fee information is unavailable for other services. Third, the individual might see qualitative information about the service provider's expertise. For a mutual fund, this would be the "soft" data contained in the ads, such as the number of professionals the money management firm employs or a write-up in a magazine (Reuter and Zitzewitz 2006). For a professional service, this information might include testimonials of past customers.

To apply the results from the previous sections, we assume that only fees are relevant for the evaluation of the quality of a mutual fund (see Carhart 1997, Chevalier and Ellison 1997, Sirri and Tufano 1998, Swensen 2005). In contrast, past performance, fees, and expertise are all relevant for the evaluation of the quality of other services.

If the potential investors in mutual funds are coarse thinkers who co-categorize investment with other professional services, the analysis of the previous sections yields the following predictions. First, mutual funds will report fees when they are low, and drop them when they are high. Second, mutual funds will report past performance when it is good, and drop performance data when it is bad. Third, mutual funds will report data on their expertise (so long as the cost of doing so is low enough), even when these data

are objectively uninformative. Note that, in deriving these predictions, we used both the results on dropping informative messages and the results on creating uninformative ones.

These predictions are broadly consistent with the evidence on mutual fund advertising. First, financial ads only rarely include information about fees (Cronqvist 2005). Only the funds with low fees, such as Vanguard, typically talk about them.

Second, as demonstrated by Mullainathan and Shleifer (2006), there is evidence that financial advertisements are more likely to include information on past returns when such information is favorable. The authors study financial advertising in *Money* and *Business Week* magazines during 1994-2003, roughly the full course of the internet bubble. The authors collect all the consumer-oriented financial ads from these magazines, classify them by content, and aggregate them in the quarterly series. One of the variables they consider is the share of ads that contain own past returns (absolute or relative) in all stock mutual fund ads. Figure 1 presents the relationship between this variable and the rolling one quarter lagged Standard and Poor's 500 Index return. As Figure 1 shows, on average only about 60 percent of the mutual fund ads present any data about own past returns, and the correlation between the inclusion of these data in the ads and past market returns is over .7 for both *Money* and *Business Week*. Indeed, Figure 1 makes clear that, after the market crash, past returns disappear from the advertisements. This finding is broadly consistent with the prediction of our model.

Third, again as shown by Mullainathan and Shleifer (2006), much of the information contained in financial advertisements is soft (e.g., describing the alleged expertise and experience of the advertiser). Figure 2 classifies the ads by T. Rowe Price, a mutual fund complex and the most frequent advertiser in the sample, into those for

growth funds, other mutual funds, and everything else, which tend to be softer ads about expertise. After the market crashes in 2001, growth fund ads disappear and are replaced, in the first instance, by the softer ads. The post-crash judges and crossing guards campaign from Charles Schwab is representative of a broader phenomenon.

Although one can rationalize all these findings in a number of ways, the perspective of this paper, in which financial advertisers free ride on their audience's broader experience – and hence co-categorization -- with choosing experts, appears to explain all three aspects of the data most simply.

5. Conclusion

This paper has supplied a simple formal model of associative thinking reflecting ideas about inference and persuasion from such diverse fields as linguistics, psychology, philosophy, politics, and advertising. The main building blocks of the model are categorization and transference: people group diverse situations into categories and use information about one member of a category to evaluate another, even if the information is objectively useless in the latter case. The model includes full Bayesian rationality as a special case, in which each situation is evaluated as if in its own category.

The model sheds light on a number of phenomena. Most importantly, it explains how uninformative persuasion can be effective, especially in low involvement situations, such as evaluating cheap goods or political candidates. The model also helps understand the pervasive phenomenon of persuaders' omitting bad payoff-relevant news from their messages. Both uninformative persuasion and omission of data are possible in our model even if the audience takes into account the strategy of the persuader. Empirically, the

model helps in thinking about several otherwise hard-to-understand persuasive messages (such as “putting silk in the bottle” of a shampoo), but also clarifies a number of puzzling features of financial advertising, such as the omission of data about fees and returns (when such data are negative), as well as the preponderance of “soft” messages which, at least in the standard financial model, should be of little interest to investors.

At the methodological level, our model suggests that key to understanding a range of empirically observed manifestations of “bounded rationality” is not either the violation of Bayes' rule, or even the failure of strategic thinking on the part of the decision maker. Rather, the failure seems to lie in the decision maker’s use of wrong models, in the very specific sense of co-categorizing distinct situations. Even when coarse thinkers apply Bayes' rule and think strategically, their inference is flawed and they are vulnerable to objectively uninformative persuasion.

As a final point, we reiterate that our paper is just a first step in the analysis of coarse thinking and persuasion. We have not asked how much of persuasion of coarse thinkers is misleading, and how much is a short-cut way to convey useful data (American Express Travelers’ Checks may indeed keep you safe.) We have treated categories as rigid and exogenously fixed. But, as Lakoff (1987) shows, categories are both multiple and fluid, so the selection of categories becomes a key problem for a persuader. Perhaps most importantly, we have focused on associative thinking rather than associative feeling. Capturing the latter with the tools of economics may significantly advance our understanding of persuasion, and much else as well.

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Appendix: Proofs of Propositions

Proof of Proposition 3: The persuader in situation $s = 0$ cannot choose to replace message m with message $m' \neq m$ in equilibrium. No matter the strategy of the persuader, the payoff if he replaces m with m' is:

$$\begin{aligned} E^{SB}(q | m', s=0) - c &= p_\phi(g | m', s=0)E^B(q | g, s=0) + p_\phi(b | m', s=0)E^B(q | b, s=0) - c \\ &= p_\phi(g | m', s=0) * 0 + p_\phi(b | m', s=0) * 0 - c \\ &= -c, \end{aligned}$$

whereas the payoff if he reports m is:

$$\begin{aligned} E^{SB}(q | m, s=0) &= 0 \\ &> -c \\ &= E^{SB}(q | m', s=0) - c. \end{aligned}$$

Hence, the persuader would be better off deviating from any strategy that places positive probability on replacing message m with message $m' \neq m$, so such a strategy cannot be consistent with equilibrium. ♦

Proof of Proposition 4. Suppose that $c < c^*$ and that the strategy of the persuader is to always tell the truth. This cannot be consistent with equilibrium since the persuader is better off deviating from this strategy when facing message $m = b$ and replacing $m = b$ with $m' = g$. In particular, given this strategy, the payoff from deviating is

$$\begin{aligned} E^{SC}(q | m'=g, s=0) - c &= E^{SB}(q | m'=g, s=0)p_\phi(s=0 | m'=g) + E^{SB}(q | m'=g, s=1)p_\phi(s=1 | m'=g) - c \\ &= E^B(q | m'=g, s=0)p(s=0 | m'=g) + E^B(q | m'=g, s=1)p(s=1 | m'=g) - c \\ &= E^C(q | m'=g, s) - c \\ &> E^C(q | m'=b, s), \end{aligned}$$

the payoff from reporting $m = b$. The final inequality comes from the fact that $c < c^*$.

Unlike in the face value case, the equilibrium probability that the persuader replaces $m = b$ with $m' = g$ when $c < c^*$ may be less than one. The reason is that, for certain parameter values, the benefit of replacing $m = b$ with $m = g$:

$$E^{SC}(q | m' = g, s) - E^{SC}(q | m' = b, s) = E^B(q | m = g, s = 1) \left[p_\phi(s = 1 | m' = g) + \frac{p(m = g | s = 1)}{p(m = b | s = 1)} p_\phi(s = 1 | m' = b) \right]$$

is lower when $\phi(b, g) = 1$ than when $\phi(b, g) = 0$ (note that the net effect of increasing $\phi(b, g)$ on the benefit from fabrication is in general unclear since $p_\phi(s = 1 | m' = g)$ decreases but $p_\phi(s = 1 | m' = b)$ increases). For example, let $p(m = g | s = 1) = p(m = g | s = 0) = 1/4$ and $p(s = 0) = 1/2$. In this case, $c^* = 2/3 E^B(q | m = g, s = 1)$ and $c^{**} = 8/15 E^B(q | m = g, s = 1)$, where $c^{**} \equiv E^{SC}(q | m' = g, s) - E^{SC}(q | m' = b, s)$ for $\phi(b, g) = 1$. Thus, since $E^{SC}(q | m' = g, s) - E^{SC}(q | m' = b, s)$ is continuous in $\phi(b, g)$, there is a mixed strategy equilibrium where the persuader replaces $m = b$ with probability less than 1 whenever $c^{**} < c < c^*$. ♦

Proof of Proposition 6: Note first that the persuader will not drop message $m = g$ with positive probability in equilibrium. To see this, consider the two possible cases where the persuader drops $m = g$ with positive probability in equilibrium: (i) the persuader drops message $m = g$ with positive probability and drops message $m = b$ with zero probability in equilibrium and (ii) the persuader drops message $m = g$ with positive probability and message $m = b$ with positive probability in equilibrium. To rule out (i), note that, if the persuader used this strategy, the payoff from dropping a message is equal

$$\begin{aligned} E^{SB}(q | m' = \emptyset, s = 0) &= p_\phi(g | m' = \emptyset, s = 0) E^B(q | m' = g, s = 0) + p_\phi(b | m' = \emptyset, s = 0) E^B(q | m' = b, s = 0) + p_\phi(\emptyset | m' = \emptyset, s = 0) E^B(q | m' = \emptyset, s = 0) \\ &= E^B(q | m' = g, s = 0) \\ &> E^{SB}(q | m' = b, s = 0), \end{aligned}$$

the payoff from reporting $m = b$. Thus, the persuader would deviate from this strategy and drop message $m = b$. To rule out (ii), note that, if the persuader behaved according to this strategy, the payoff from dropping a message is equal:

$$\begin{aligned}
E^{SB}(q | m' = \emptyset, s = 0) &= p_\phi(g | m' = \emptyset, s = 0)E^B(q | m' = g, s = 0) + p_\phi(b | m' = \emptyset, s = 0)E^B(q | m' = b, s = 0) + p_\phi(\emptyset | m' = \emptyset, s = 0)E^B(q | m' = \emptyset, s = 0) \\
&= p_\phi(g | m' = \emptyset, s = 0)E^B(q | m' = g, s = 0) + p_\phi(b | m' = \emptyset, s = 0)E^B(q | m' = b, s = 0) \\
&< E^B(q | m' = g, s = 0) \\
&= E^{SB}(q | m' = g, s = 0).
\end{aligned}$$

Thus, the persuader is better off deviating by always reporting message $m = g$.

Hence, in equilibrium, the set of messages that the persuader drops with positive probability can at most equal $\{b\}$. Suppose that the persuader drops $m = b$ with positive probability in equilibrium and drops $m = g$ with zero probability. Then, the equilibrium payoff from dropping a message equals

$$\begin{aligned}
E^{SB}(q | m' = \emptyset, s = 0) &= p_\phi(g | m' = \emptyset, s = 0)E^B(q | m' = g, s = 0) + p_\phi(b | m' = \emptyset, s = 0)E^B(q | m' = b, s = 0) + p_\phi(\emptyset | m' = \emptyset, s = 0)E^B(q | m' = \emptyset, s = 0) \\
&= E^B(q | m' = b, s = 0) \\
&= E^{SB}(q | m' = b, s = 0),
\end{aligned}$$

and the persuader is indifferent between dropping and not dropping message $m = b$. But this contradicts our assumption that, when indifferent, the persuader chooses not to drop the message. Hence, there does not exist a sequential equilibrium satisfying our assumptions in which the persuader drops any messages with positive probability.

It is easy to show that there is, in fact, a sequential equilibrium where the persuader always reports $m = g$ and $m = b$. ♦

Proof of Proposition 7: There is an equilibrium where the persuader drops message $m = b$ with probability one. To see this, let the persuader's strategy be described by $\phi(g, g) = 1$ and $\phi(b, g) = 1$. It is clear that the persuader would not wish to deviate from this strategy by dropping $m = g$. He also would not wish to deviate from this strategy by reporting $m = b$ since the payoff from dropping $m = b$ is greater:

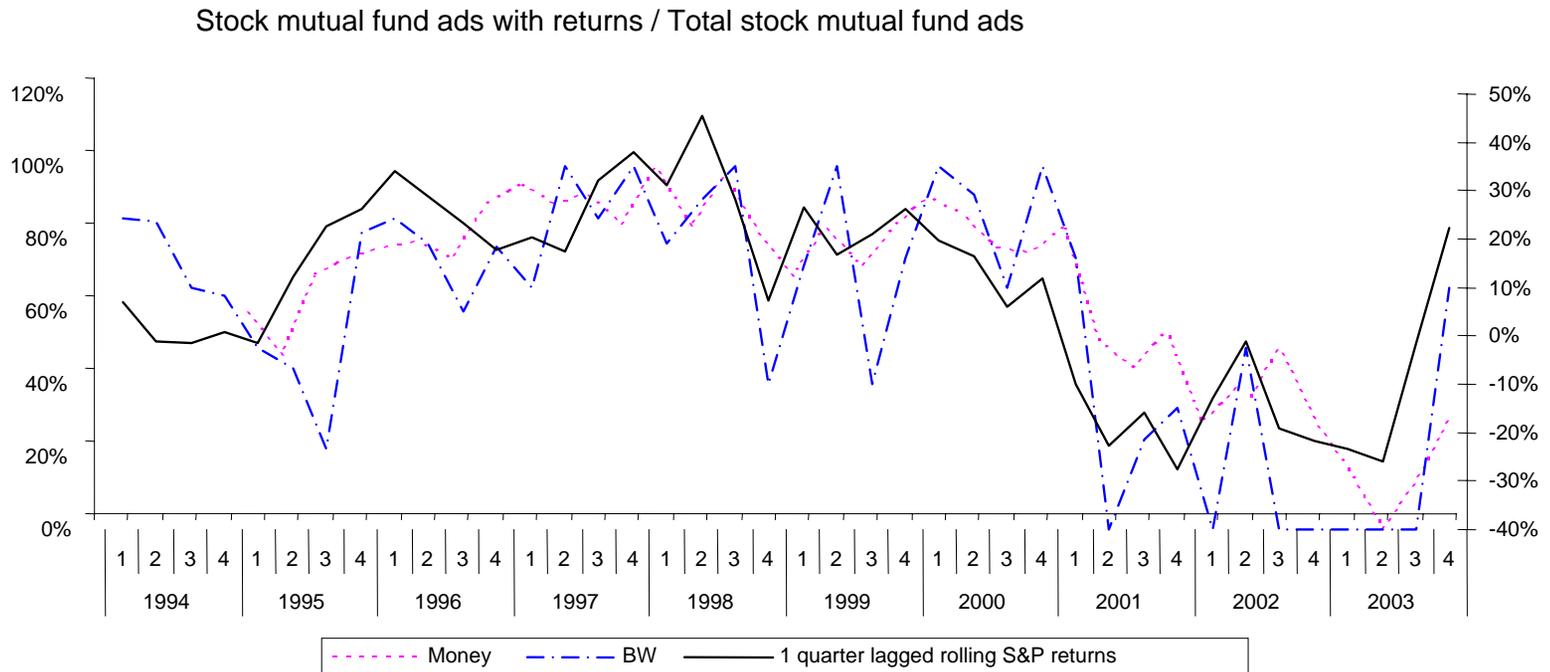
$$\begin{aligned}
E^{SC}(q | m' = \emptyset, s = 0) &= E^{SB}(q | m' = \emptyset, s = 0)p_{\phi}(s = 0 | m' = \emptyset) + E^{SB}(q | m' = \emptyset, s = 1)p_{\phi}(s = 1 | m' = \emptyset) \\
&= E^B(q | m' = b, s = 0)p_{\phi}(s = 0 | m' = \emptyset) + E^B(q | m' = \emptyset, s = 1)p_{\phi}(s = 1 | m' = \emptyset) \\
&= E^B(q | m' = b, s = 0)p_{\phi}(s = 0 | m' = \emptyset) \\
&> E^B(q | m' = b, s = 0) \\
&= E^{SC}(q | m' = b, s).
\end{aligned}$$

In addition, there cannot be an equilibrium where the persuader drops message $m = b$ with probability less than one. The reason is that, no matter the persuader's strategy, ϕ' , he would strictly prefer dropping message $m = b$ over reporting the message:

$$\begin{aligned}
E^{SC}(q | m' = \emptyset, s = 0) &= E^{SB}(q | m' = \emptyset, s = 0)p_{\phi'}(s = 0 | m' = \emptyset) + E^{SB}(q | m' = \emptyset, s = 1)p_{\phi'}(s = 1 | m' = \emptyset) \\
&\geq E^B(q | m' = b, s = 0)p_{\phi'}(s = 0 | m' = \emptyset) + E^B(q | m' = \emptyset, s = 1)p_{\phi'}(s = 1 | m' = \emptyset) \\
&= E^B(q | m' = b, s = 0)p_{\phi'}(s = 0 | m' = \emptyset) \\
&> E^B(q | m' = b, s = 0) \\
&= E^{SC}(q | m' = b, s).
\end{aligned}$$

Thus, in equilibrium, it must be the case that $\phi(b, g) = 1$. It is easy to see that it must also be the case that $\phi(g, g) = 1$ so there is a unique equilibrium. ♦

Figure 1



Correlations:

Money / S&P : 71.0%
BW / S&P: 74.3%

Means:

Money: 62.4%
BW: 59.0%

Figure 2

T.RowePrice Ad Composition (Money Magazine)

