Information Avoidance

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We commonly think of information as a means to an end. However, a growing theoretical and experimental literature suggests that information may directly enter the agent's utility function. This can create an incentive to avoid information, even when it is useful, free, and independent of strategic considerations. We review manifestations of information avoidance as well as theoretical and empirical research on reasons for why people avoid information, drawing from economics, psychology, and other disciplines. The review concludes with a discussion of some of the diverse (and costly) individual and societal consequences of information avoidance.

> What sense had I of her stol'n hours of lust?
> I saw't not, thought it not, it harm'd not me:
> I slept the next night well, was free and merry;
> I found not Cassio's kisses on her lips:
> He that is robb'd, not wanting what is stol'n,
> Let him not know't, and he's not robb'd at all.
>
> Othello

The standard economic analysis of decision making holds that information is valuable to the extent, and only to the extent, that it leads to better decisions. A straightforward implication is that valid information should never be actively avoided, except for situations in which ignorance confers a strategic advantage. Even if information has no prospect of improving decision making, one can, according to standard economic assumptions, ignore it at no cost. Consistent with standard theory, there are countless situations in which information is useful and sought after. Indeed, there are situations in which people seek out, and are even willing to pay for, apparently useless information (see Loewenstein, 1994; Eliaz and Schotter, 2010; Powdthavee and Riyanto, 2014). Our focus in this review is, however, on the opposite phenomenon–on

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the many situations in which people avoid information, even when it is free and could improve decision making. As we will discuss, information avoidance occurs not only when there is a strategic rationale for it but also when beliefs directly enter the utility function.

Casual observation, as well as considerable theoretical, laboratory, and field research that we review, suggests that information avoidance is, in fact, common. Investors avoid looking at their financial portfolios when the stock market is down, an ostrich effect (Karlsson, Loewenstein and Seppi, 2009; Sicherman et al., 2015). Individuals at risk for health conditions often eschew medical tests (e.g., for serious genetic conditions or STDs) even when the information is costless and should, logically, help them to make better decisions (Ganguly and Tasoff, 2014; Sullivan et al., 2004; Lerman C et al., 1996, 1999; Lyter et al., 1987; Oster, Shoulson and Dorsey, 2013; Thornton, 2008). Managers often avoid hearing arguments that conflict with their preliminary decisions (Schulz-Hardt et al., 2000), even though such arguments could help them avoid implementing measures that are ill-founded. These examples only scratch the surface of a wide variety of situations in which people avoid information.

We do not review the broad, and almost infinite, range of situations in which people fail to obtain information that is in their power to secure, but focus on a narrower range of phenomena that could be termed 'active information avoidance.' Although people often fail to collect or attend to potentially helpful information, only a small fraction of such instances qualify as active information avoidance. We specify two necessary criteria for avoidance to be classified as 'active': awareness that the information is available and free access to the information.

First, the individual has to be aware that the information exists. It is hardly a choice to avoid information that one does not even know is available. Knowing that information exists does not, of course, generally mean knowing its valence, much less its specific content. Thus, a course instructor can know that teaching ratings have been collected, but not know how favorable or unfavorable they are, particular in comparison to her expectations. However, even if people know the content of information, they may yet choose to avoid it. This may seem counter-intuitive, but if you know that your bank account is depleted, you might still choose not to log on to your bank's website and peruse your balance, and if you know that you are very dissatisfied with your appearance, you might ask your hair-dresser to turn the chair away from the mirror. Sicherman et al. (2015) observed that investors were

more likely to log in multiple times on weekends (when the first login would have revealed complete information because the market was closed) when the market was up. In these types of cases, one is aware quite precisely of what information would be obtained by looking, but can still be motivated to not look.

Second, the information in question has to be costless to obtain, or even costly to avoid obtaining. If a medical test is expensive, it will be difficult to determine whether an individual who foregoes the test does so due to its cost, a preference to not find out the information, or a combination of the two. Indeed, it is even possible that people could use the cost to justify, to themselves or to others, a decision to avoid getting tested that actually had other motives. If getting tested is costless, however, then failing to get the test would qualify as active information avoidance (ruling out confounding factors such as an impact on insurance rates). Because the remainder of the paper focuses exclusively on active information avoidance, we drop the word active for brevity, and refer simply to information avoidance.

Information avoidance should be of interest to economists because it is personally and economically consequential. Most obviously, it deprives people of potentially valuable inputs into decision making. A person who could, but does not, get tested for a transmittable disease, for example, could not obtain treatment for their condition and might transmit it to others. Both of these consequences are present for HIV/AIDS where drug treatments both prolong life and decrease the risk of transmission.

Information avoidance also deprives people of potentially useful feedback they could use to fine-tune their behavior. Teachers who fail to peruse their teaching ratings, for example, miss out on information they could use to improve their teaching. Executives and leaders who don't tolerate criticism, likewise, deprive themselves of information that could help them make valuable changes to their behavior. In many instances, for reasons we will discuss, the people who could most benefit from feedback are, paradoxically, most likely to deprive themselves thereof.

Information avoidance can also lead people to take selfish or immoral actions (or fail to take altruistic actions), as highlighted by the research on 'moral wiggle room' (Dana, Weber and Kuang, 2007). A classic example of this effect is the propensity of prosperous people to avoid poor neighborhoods where they would feel guilty about their own relative privilege (Cain, Dana and Newman, 2014; Dana, Cain and Dawes, 2006; McGoey, 2012).

Avoiding information that might challenge existing beliefs (one of varieties of informa-

tion avoidance we discuss) can contribute to political polarization as voters and legislators are less likely to find common ground (Kahan et al., 2012). The political paralysis resulting from such polarization may, in turn, prevent potentially advantageous legislation to deal with problems such as climate change (Marshall, 2014). Information avoidance can also promote media bias. If people pay attention only to media outlets that provide information consistent with their beliefs, those outlets will be discouraged from airing contradictory points of view (Gentzkow and Shapiro, 2010). The desire to avoid information discordant with one's beliefs can, more generally, lead to a wide range of economically consequential outcomes: geographic sorting by beliefs, proselytizing, and even to violence toward those one would like to silence (Golman et al., 2015).

Information avoidance is not, however, always a bad thing. People would avoid information much less often if they did not obtain direct and immediate utility benefits from doing so. For example, bad teachers who don't look at their course ratings may have higher levels of utility (although their students may not), and persons at risk of diseases, such as genetic disorders, may be able to lead perfectly happy lives until emerging symptoms or test results force the reality of their situation upon them. The (dis)utility people derive from beliefs should be considered a legitimate ingredient in their welfare.

Information avoidance can also confer practical benefits for decision making and daily functioning. The weak teacher who avoids his[1] teaching ratings might even teach better, at least in the short-run. A teacher who is already suffering from performance anxiety might only do worse if their fears about student perceptions were confirmed. The ostrich effect may also help investors not to panic-sell when markets are down. Information-avoidance that contributes to self-serving biases in negotiations might help self-righteous negotiators secure better deals, even if the same biases contribute to higher rates of impasse. And, through a process perhaps not dissimilar to moral wiggle room, a cuckolded lover may be able to maintain, and continue to enjoy and benefit from, a fulfilling relationship by ignoring information that would be quite easy to obtain.

Section 1 of the paper reviews different manifestations of information avoidance. Although one might view information avoidance as a straightforward matter of simply not looking, there are many other tactics that people can and do use to avoid information. People may, for example, not draw obvious conclu-

[1]For simplicity and consistency, we use the male pronoun; all such uses would equally apply to females.

sions from data. They can also divert their attention from, or conveniently forget, information they wish they had not obtained in the first place.

In section 2, we review empirical research and theory dealing with information avoidance, in economics, psychology, and other disciplines. We organize the literature according to the reasons why people avoid information. Some of these reasons are consistent with standard economic theory, broadly construed. For example, information can be avoided for strategic reasons; ignorance is sometimes a strength in bargaining (Schelling, 1956). Other reasons are inconsistent, or less consistent, with standard theory. For example, information can have direct hedonic value (positive or negative), separate from its usefulness. Behavioral theories that incorporate belief-based utility can help explain why a person might avoid information that has material value.

Section 3 concludes the paper with a discussion of the diverse individual and societal consequences of information avoidance.

1. Methods of information avoidance

Although it is natural to think of information avoidance as a matter of simply not obtaining information, there are, in fact, a diversity of information avoidance strategies. We construe information avoidance broadly, to include any behavioral or cognitive process that enables one to avoid reaching the conclusions that an unbiased perusal and analysis of information would lead to.

Physical avoidance: People can choose to avoid reading specific newspapers or magazines, listening to specific radio or television shows, looking at their teaching ratings, or having conversations with specific people. In some cases, they can, and do, even pay to avoid being exposed to such information. In a clever and particularly clean demonstration of such an effect, Eil and Rao (2011) had experimental subjects either take an IQ test or have their attractiveness rated by other subjects. Subjects then received preliminary feedback on a subset of IQ questions or attractiveness ratings which hinted at how their final IQ test or attractiveness rating was likely to come out. People who received initial unfavorable information about their appearance or intelligence, relative to their expectations, were less likely to choose to obtain the full information, and some were even willing to pay to avoid obtaining it.

Ganguly and Tasoff (2014) presented participants with a task involving testing for herpes simplex virus 1 (HSV-1) and virus 2 (HSV-2), two sexually transmitted diseases. Both are incurable, but the latter was viewed by most subjects as a more serious condition.

Seven percent of participants were willing to forgo a $10 payment to avoid obtaining the test results for HSV-1, while twelve percent were willing to forgo the same amount for the HSV-2 test, suggesting that people found the latter test more threatening. Moreover, 77 percent of those who sacrificed $10 to avoid a HSV-1 test also avoided a HSV-2 test, whereas among those who do not avoid an HSV-1 test, only 8 percent avoided an HSV-2 test. Additionally, participants who reported being worried about their STD status were more likely to forgo money to not be tested, and those who reported being in positive mood states were also more likely to avoid getting tested (although an explicit manipulation of mood did not have a significant effect).

Getting tested for an STD may require people to return to obtain the results and they may avoid information by failing to do so. Sullivan et al. (2004) surveyed more than 2,200 people who were at high risk of contracting HIV and found that of those who had been tested for HIV, 18 percent failed to return to the test center to obtain the results. Of those, 23 percent said they did not go back because they were afraid to get the results.

Inattention: Even when people do physically obtain information, or have it at their fingertips, they often have the ability to not focus their attention on it. Cognitive psychologists have long known that attention is a limited resource, selectively employed to facilitate information processing (Broadbent, 1958; Simon, 1971; Schneider and Shiffrin, 1977). Research by economists has built on this insight, proposing that, like any scarce resource, attention ought to be allocated efficiently and the optimal allocation may involve rational inattention to some pieces of information (Sims, 2003; Sallee, 2014; Caplin and Dean, 2014).

Once one recognizes that information is a source of utility in its own right (apart from objective outcomes), it follows that people may also allocate attention in ways that respond to hedonic motivations. For example, people may choose to pay attention to information that is likely to be positive, while remaining inattentive to unfavorable or threatening information (even when that information may be somewhat more useful.

Inattention can take a range of forms, some of which border on physical avoidance. For example, if one glances at a headline, then decides not to pay attention to (i.e., read) the associated article, this could be classified either as a case of inattention or physical avoidance. However, if one reads the article but then willfully and successfully chooses not to think about it, this would be an unambiguous case of inattention. Brock and Balloun (1967) presented participants in a lab experi-

ment with speeches that supported or rejected a link between cancer and smoking and that were favorable or unfavorable toward Christianity. The speeches were masked by noise, which participants could remove by repeatedly pressing a button. In four experiments, smokers were more eager to remove static in the speech that rejected a link between smoking and cancer than the speech that supported a link between the two, and vice versa for non-smokers. They found a weaker link (but significant in three of the four experiments) between a higher frequency of self-reported praying and reduced removal of static from the anti-Christianity message.

Biased interpretation of information: When information is obtained and attended to, and its implications are adverse, it is still possible for an individual to avoid drawing the most logical conclusions from it. Psychologists have long believed that people filter out negative information in order to maintain mental health and wellbeing (Taylor and Brown, 1988). A number of studies in both psychology (e.g. Lord, Ross and Lepper, 1979) and economics (e.g. Babcock et al., 1995) find that people weigh and interpret evidence in a fashion that supports what they are motivated to believe, and that they tend to denigrate the quality of evidence that contradicts beliefs that they hold or would like to hold. In one of the strongest demonstrations of the effect, Babcock et al. (1995) had negotiators read case materials either before or after they were assigned to the role (plaintiff or defendant) they would be negotiating. When they were assigned their role before reading the case materials, they were far more biased than when they were assigned after, and, as a result, they were more likely to reach costly impasse. In a secondary analysis, they had subjects rate the importance of a eight arguments favoring the plaintiff and eight favoring the defendant. Plaintiffs rated arguments favoring their side as more compelling than those favoring the defendant, and vice versa. The study supports the idea, later embodied in a model of confirmation bias proposed by Rabin and Schrag (1999), that people do not simply arrive at self-serving beliefs at will, but become biased because they update their beliefs differently when information supports their pre-existing (or desired) beliefs than when it fails to support those beliefs. Möbius et al. (2014) find in an experiment that people update more when receiving a positive signal about their ability than whey they receive a negative signal. Even with a positive signal, however, they update less than Bayesian updating. Asymmetric and conservative updating work in tandem to provide a good balance between protecting one's ego utility while avoiding a potentially costly

overestimation of one's ability.

Lord, Ross and Lepper (1979) recruited subjects who had strong views in favor of, or in opposition to the death penalty, and presented to both groups two research studies, one suggesting the death penalty is effective at deterring crime and one indicating it is not. Subjects were then asked to evaluate the quality of both studies and how convincing they thought they were. Research that conflicted with their previously held beliefs scored lower on both measures than research that supported their prior beliefs. As a result, presenting both sides with the same evidence increased, rather than decreased, belief polarization.

Glaeser and Sunstein (2013) examine two mechanisms that can cause balanced news to give rise to increased polarization. First, even if people process information in a Bayesian fashion, the same information can have opposite effects if people begin with different priors (see also Benoît and Dubra, 2011). Information recipients whose views are reinforced by the information will simply accept it, whereas those whose beliefs conflict with the message will tend to dismiss it and to question the quality or impartiality of the source. Second, in a process involving somewhat more nuanced psychology, the memories and convictions activated by the receipt of information are likely to depend on an individual's prior convictions, which can produce what Glaeser and Sunstein call a "memory boomerang." New and conflicting information may remind people of evidence reinforcing their beliefs, and this reminder can outweigh the new information, leading to an overall affirmation of their existing views.

In the IQ and attractiveness rating study discussed previously, Eil and Rao (2011) also asked subjects who had received preliminary feedback to provide their own evaluations of where the ultimate ratings were likely to come out, incentivizing subjects for accuracy. Those who received initially favorable information about their appearance or intelligence tended to upwardly adjust their beliefs about these attributes. However, the reception of negative information about these attributes led to no comparable downward adjustments of self-perceptions.

Families who suffer an ambiguous loss of loved ones (e.g., those missing-in-action in war, 'disappearances' caused by authoritarian regimes, abductions, or outdoor sports-related disappearances) often refuse to accept the reality of the individual's death, even in the face of overwhelming evidence (Boss, 1999). Such families seem to experience a kind of expectational purgatory, facing but not adapting to their loss. Denial of reality in this situation can be viewed as a form of information

avoidance with great negative hedonic consequences.

While one might expect people who are more intelligent to be less likely to misinterpret information in a motivated fashion, there is some research which suggests quite the opposite–i.e., that people marshal their intelligence in the service of believing what they want to believe. One paper by Gino and Ariely (2012) found that research subjects who scored higher on a measure of creativity (not, in fact, intelligence) were better able to come up with moral justifications for dishonest behavior, and behaved more dishonestly as a result. Kahan et al. (2012) have also found that increased scientific expertise does not lead to convergence on scientific issues such as the reality of climate change. Indeed, the opposite is the case: the beliefs of people with the highest levels of scientific literacy exhibited the most extreme levels of polarization.

Forgetting: Even when information has been received and attended to, a final information-avoidance strategy available to individuals is to forget the information. Although often thought of as a passive process, people may deliberately and selectively fail to rehearse negative information and therefore forget it over time (Bénabou and Tirole, 2002). Motivated forgetting may help people deal with unpleasant life experiences (Anderson and Huddleston, 2012) or cognitive dissonance (Akerlof and Dickens, 1982). Shu and Gino (2012) conducted four laboratory experiments in which participants completed an ability-based task and were paid according to their performance. The task was designed to give participants in some conditions the opportunity to overreport their performance (and thus increase their earnings by cheating). When given an opportunity to cheat, those who cheated recalled previous items from a moral code—consistent with motivated forgetting. This difference persisted even when participants were paid to accurately remember the items.

Ehrlich et al. (1957) conducted a lab experiment to test whether people avoid information that challenges the wisdom of a previous choice. In a lab experiment, they asked participants who had purchased cars to recall their exposure to car advertisements. Participants who had bought a new car (but not owners of older cars) were more likely to recall reading advertisements promoting their car than ads promoting other models. They then presented participants with advertisements of eight makes of cars and asked them to provide comments on two of them. Owners of both new and old cars preferred evaluating advertisements of their own make than of differ-

ent makes. Participants further reported other makes they had considered buying, but they were not less likely to look at and comment on the advertisements of those makes (which would have been consistent with avoiding information that may have undermined their choice).

Even when people are unable to, or for other reasons fail, to engage in motivated forgetting, they could still engage greater efforts in remembering information they wanted to remember, as compared with information that they would prefer to forget. Bernheim and Thomadsen (2005), for example, suggest that people with unbiased but imperfect memory might leave themselves reminders that bring to mind pleasant memories, but choose not to leave themselves reminders about events that evoke unpleasant thoughts. Bénabou and Tirole (2011) suggest that people make investments based on their beliefs in order to remind themselves of their social identities.

Self-handicapping: Self-handicapping is a highly specialized form of information avoidance that is difficult to classify into one of the other, broader, categories. Self-handicapping refers to people's tendency to choose tasks that are poorly matched to their own abilities–either too easy or too difficult–or to take actions that undermine their performance, as a strategy for avoiding information about their abilities (see Bénabou and Tirole, 2002, for a theoretical perspective). In a classic study of self-handicapping Berglas and Jones (1978) randomly assigned participants to complete a test consisting of either soluble or insoluble questions. After completing the test, they were given positive feedback about the number of questions they answered correctly (irrespective of how they really did). Then, prior to taking a second test that they were told would be similar to the first, participants were offered a choice between a performance enhancing and a performance inhibiting drug. In the condition with insoluble questions (in which subjects believed that their strong performance was a fluke that would unlikely be repeated), significantly more participants preferred the performance inhibiting drug (an effect driven by male participants).

2. *Varieties of information avoidance*

In this section, we review theories that predict information avoidance, as well as empirical research providing evidence for or against the specific mechanisms implicated by the theories. We organize this section of the review by the cause of (i.e. the reason for) information avoidance. A generic time-line of decision making can help to fix the discussion.

At time $t = -1$, an individual receives a preview of some information that will be in his power (at $t = 0$) to obtain. At $t = 0$, the indi-

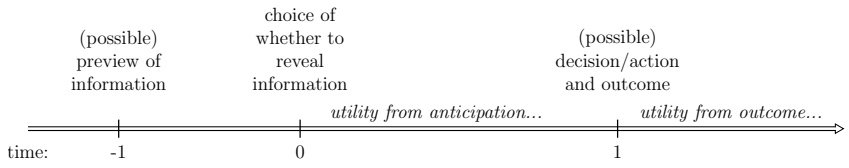

FIGURE 1. TIME-LINE OF DECISION MAKING

vidual then decides whether to reveal information. At time $t = 1$, in some–although not all–situations, the individual can then make a decision or take an action that could be informed by the information. An investor, for example, might listen to the evening news at $t = -1$, learn that the stock market had fallen, but retain some uncertainty about the change in his own portfolio. At time $t = 0$, he could then decide whether to log in to his brokerage account and learn how his portfolio had actually performed. At time $t = 1$, in part based on whether or not he logged in, and if so what he discovered, he might then decide to engage in trades.

There are, of course, numerous possible complexities not captured by the time-line. For example, the situation might be repeated (as in the case of an investor who every day faces the option of logging in), and the two decisions might be linked in some fashion (for example, the investor cannot trade without logging in). Similarly, someone may have multiple opportunities to acquire a fixed piece of information (e.g. the results of a genetic test).

As the figure shows, there are two ways that the first information acquisition decision the individual makes could affect his utility. First, deciding whether to reveal the information can have a direct impact on utility from anticipation or realization. The investor will feel differently, depending on whether he logs on or not. In most scenarios, he will have expectations (and some uncertainty) about what choosing to 'look' will reveal and hence how he will feel if he does reveal the information. Second, the investor might take an action that could be affected by the choice of whether to reveal the information and, if information is revealed, its content. The quality of the action–whether it has beneficial or adverse consequences–could then, also, affect his utility.

The examples of information avoidance that we have already mentioned, as well as many others that we discuss in this section, can be classified into two broad categories corresponding to this division of utility effects: those driven by hedonic considerations (typi-

cally a desire to avoid bad news because it will make one feel bad) and those driven by strategic considerations. Within strategic considerations, we draw a further distinction between those involving only the decision maker, and those involving other parties. As an example of the former, an individual who was about to give a significant public address might choose not to view a video of himself giving a previous talk, so as to prevent a presentation-debilitating plunge in confidence or a surge of self-consciousness. As an example of the latter, during collective bargaining, a labor union leader could choose not to poll workers about their willingness to accept management's first offer, thus maintaining credible uncertainty about workers' actual reservation wages and positioning him to bargain more effectively on their behalf (Schelling, 1956).

1. Hedonically-driven information avoidance

The category of hedonic reasons for avoiding information itself encompasses a diversity of different motives, and a wide range of theories incorporate these motives and make it possible to examine their implications. Here, we examine seven distinct psychological mechanisms that can produce information avoidance: preferences for resolution of compound lotteries, disappointment aversion, anxiety, regret aversion, optimism maintenance, attention effects and belief investments. We examine each of these in turn.

Preferences for resolution of compound lotteries: Imagine an individual who is coming up for tenure, and a series of committees each have to approve the case for tenure to be ultimately granted. Would the individual prefer to know of the intermediate committees' decisions, or only to be appraised of the final decision? Avoidance of information about the resolution of intermediate stages of compound lotteries, as in the example, can derive from risk preferences violating expected utility. In general, receiving information about a future lottery creates a two-stage compound lottery. An individual would choose not to find out the results of the first stage of the lottery if he preferred the compound lottery to the expectation of the second stage lottery conditional on the results of the first stage (see, e.g., Snow, 2010; Hoy, Peter and Richter, 2014).

Kreps and Porteus (1978) provide a mathematical framework in which a lottery is specified by its time of resolution along with its possible outcomes and probabilities, so that a wager that pays off tomorrow based on a coin flip today is different from an identical wager based on a coin flip taking place tomorrow (just in time to determine the payoff). Their model provides a representation of preferences for earlier or later resolution of lotter-

ies, and, if later resolution is preferred, then an individual would choose to avoid information about the outcome of the lottery until the payoff is to be received. Grant, Kajii and Polak (1998) characterize preferences to obtain or avoid information that result from a wide range of preferences regarding compound lotteries. Their framework generalizes that of Kreps and Porteus (1978). In Grant, Kajii and Polak's framework, the preference to avoid information in order to preserve a lottery's desired profile of uncertainty is indistinguishable from the preference to have that simple lottery rather than a materially equivalent two-stage compound lottery. Avoiding information, in effect, reduces the compound lottery.

Following a similar line of reasoning, Palacios-Huerta (1999) and Dillenberger (2010) suggest that preferences about compound lotteries could stem from preferences to have them resolved gradually or all at once (not just from preferences for earlier versus later resolution). If individuals prefer one-shot resolution of lotteries, then they may avoid partial information about their prospects and instead wait to find out just the eventual outcome. Similarly, if individuals prefer gradual resolution, then they may temporarily avoid full information about the resolution of the compound lottery and instead gather this information in pieces. Indeed, Zimmermann (2014) finds that people have heterogeneous preferences about gradual or one-shot resolution of lotteries; about half of subjects do in fact choose to avoid receiving early information about the outcome of a lottery but instead choose to get this information in pieces over the course of a few days.

Risk-, Loss- and Disappointment aversion: If we assume that utility depends directly on beliefs, then information avoidance can be derived from simple assumptions. Utility function concavity alone, perhaps somewhat surprisingly, implies that information should generally be avoided, in the absence of adverse material consequences for doing so (Gul, 1991; Andries and Haddad, 2014). The logic is simple: the utility down-side of coming out below expectations is simply greater than the up-side, an effect also predicted by models that incorporate loss aversion (Köszegi and Rabin, 2009; Köszegi, 2010). Acquiring information and resolving uncertainty would be akin to accepting the risk of possible disappointment or elation rather than simply maintaining one's prior expectations. When the information is instrumental, of course, risk aversion can be eclipsed by the usefulness of the information, e.g., to treat a medical condition if it is diagnosed (see, for example, Fels, 2015). The strength of this account of information avoidance–that the pre-

diction is so robust–is also its major weakness. It predicts information avoidance that is much more widespread than what is actually observed. In Eliaz and Schotter (2010), for example, participants were faced with a decision under uncertainty about the state of the world. The same decision was optimal in any state of the world (i.e. the state of the world would not have given them any useful information), yet they were willing to pay to find out which state of the world they were in. Such findings may suggest an inherent curiosity that often motivates information acquisition (see Loewenstein, 1994; Golman and Loewenstein, 2015*a*), even when the expected (hedonic) impact of receiving the information is negative (Kruger and Evans, 2009).

Disappointment aversion leading to information avoidance may emerge naturally in some situations, without assuming utility function concavity, if people use information to make coarse categorical judgments (Köszegi, 2006). If the balance of evidence is just above the threshold necessary for a positive judgment, additional information could reaffirm one's belief (a neutral outcome) or could disappoint (a negative outcome), but would be unlikely to elate (a positive outcome). In these cases, information would be avoided to guard against disappointment.

In Bell (1985) and Loomes and Sugden (1986), decision makers are more disappointed if they receive the low payoff that had a small probability than if the probability of receiving a low payoff is large, holding constant the expected value. Outcomes farther below one's expectation give rise to more disappointment. Bell (1985) applies this assumption to delegated informational preferences. His model implies that in breaking bad news to a recipient, the delegate should shield the recipient and disclose the information in small pieces to slowly adjust the recipient's expectations, whereas good news should be revealed immediately.

Anxiety: Feelings of anxiety could cause an individual to avoid potentially useful information. Maslow (1963) suggested that people sometimes avoid finding out about their risk for a disease or disaster, for example, in order to reduce anxiety about such events. Indeed, many medical patients do find it stressful to be given more information about an unpleasant impending procedure than they absolutely require (Miller and Mangan, 1983). Some cancer patients avoid information about the disease in order to remain hopeful for a recovery (Case et al., 2005; Leydon et al., 2000; Nosarti et al., 2000). These motives can be represented in an expected utility model in which people derive utility from anticipation of future events (as well as from eventual

outcomes) (Caplin and Leahy, 2001; Köszegi, 2003).

In Caplin and Leahy's (2001) model, utility is derived from psychological states, which encompass not only present material outcomes but also beliefs about the probability of material outcomes that may occur in the future. When getting incomplete information runs the risk of engendering anxiety about uncertainties that cannot be resolved, a person might choose to avoid this information. For example, obtaining a medical test that would diagnose a disease exposes one to the prospect, if the test comes out positive, not of just knowing one has the disease, but of anxiety and stress about the course of the disease. Avoiding the diagnosis cannot help one avoid the disease (and, may even eliminate an opportunity to treat it), but it can help one avoid the stress and anxiety. Note, however, (as will be discussed momentarily) that people's intuitions about the effect of information on anxiety are often wrong–i.e., that knowing the worst often engenders less anxiety than suspecting the worst.

Köszegi (2003) proposes a model in which agents derive utility from their beliefs. Learning about a bad health state may lead to gains in utility from any subsequent treatment, but also cause disutility because his beliefs change (i.e. he no longer thinks of himself as healthy). The model predicts that the worse the potential bad outcome is, the less likely an individual will be to seek a diagnosis–the opposite of what standard economic theory predicts; but conditional on getting a diagnosis, patients should want the most accurate available. Less surprisingly, the model predicts that individuals would not want to avoid information about conditions known to be perfectly treatable.

Information avoidance due to anxiety can clearly be counterproductive if it delays beneficial action. For example, somewhat disturbingly, women with breast cancer symptoms that are getting worse wait longer to visit a physician than those whose symptoms are steady or disappearing (Caplan, 1995), as do women who have first-hand experience with a family member's breast cancer (Meechan, Collins and Petrie, 2002). Avoidance can also be counterproductive if it leaves individuals in a state of expectational 'limbo' which impedes their adaptation. In a paper titled "happily hopeless," for example, Smith et al. (2009) elicited the happiness and life satisfaction of people who had colostomy or ileostomy operations one week, one month and six months after the operation. The main focus of the study was on the comparison between those who had operations that were irreversible, and those who had procedures that were poten-

tially reversible in the future. Uncertainty in this situation turned out to be a bad thing; people with irreversible procedures became progressively happier over time until their happiness and life satisfaction was indistinguishable from that of the general population. In contrast, although people with potentially reversible conditions began marginally happier than people with irreversible ones, the happiness of this group declined over time, and fell far below that of the irreversible group. These results don't speak to information avoidance per se, but do show how the kind of uncertainty that information avoidance can produce can impede adaptation and induce long-term misery.

Chater and Loewenstein (2015) propose that an inherent drive for sense-making (see also Dervin, 1998) may lead people to avoid information that might not fit with their current understanding of the world. For example, people may avoid useful information about how to invest their money if they fear that they will not understand it. Similarly, struggling students may choose not to attend class to avoid being presented with information they cannot make sense of. Because an inability to make sense of new information is aversive, a student who anticipates that a lecture will be confusing might choose to avoid the situation altogether rather than struggle to make sense of only a small fraction of the information.

Regret aversion: Regret occurs when people compare the outcome of a decision with what would have happened if they had made a different choice (e.g. Loomes and Sugden, 1982, 1987). Regret aversion, like disappointment aversion, can generate information avoidance. In the case of regret-aversion, however, the information avoided is about what the outcome would have been had one taken an alternative course of action. Although we are unaware of any application of regret theories to this phenomenon, there is a large empirical literature in psychology documenting consumers' avoidance of information about unchosen products, or avoidance of information about the risks of products they have chosen (e.g. Frey and Stahlberg, 1986; Jonas et al., 2001). Ehrlich et al. (1957), for example, found that new car owners pay more attention to advertisements for the model they purchased than for models they had considered but did not buy. Brock and Balloun (1967) observed that smokers attend more to pro-smoking messages and that nonsmokers attended more to anti-smoking messages.

Optimism maintenance: Both theoretical models in economics (Brunnermeier and Parker, 2005) and a very large literature in psychology (summarized in Sharot, 2011) recognize, and provide theoretical foundations

for, the prevalence and benefits of optimism. In Brunnermeier and Parker's (2005) model, people can choose to hold optimistic beliefs, which are a source of anticipatory utility and thus improve immediate well-being (potentially at the risk of intensifying future disappointment). Information avoidance can occur in this context because acquiring information can interfere with the ability to maintain unwarranted optimism. To the extent that people are motivated to maintain optimistic expectations, they will be similarly motivated to avoid information that could force a downward revision of those expectations.

Oster, Shoulson and Dorsey (2013) provide evidence of information avoidance that is consistent with optimism maintenance by people at risk of Huntington's disease. Many people at known risk of carrying the disease fail to get tested, despite the manifest benefits that having the information could have for decisions such as whether to have children. Two key pieces of evidence that are consistent with optimism maintenance as opposed to other explanations for information avoidance are that: (1) people who fail to get tested make life decisions that are indistinguishable from those who get tested and discover they do not carry the disease, but very different from those who get tested and discover they do carry the disease, and (2) people at risk for Huntington's appear to be generally optimistic about the (un)likelihood that they have the disease.

Also consistent with optimism maintenance are findings from the experiment, discussed above, by Eil and Rao (2011). Presenting people with a hint about attributes they care about (their own intelligence or attractiveness), the researchers find that people who receive hints which suggest that more detailed information might fall below their expectations (which, again, are generally optimistic), avoid obtaining the information, even when it is costly to do so.

Bénabou (2013) also presents a model on the phenomenon of "groupthink" that could be interpreted in terms of optimism maintenance. In Benabous model, groups of people decide whether to invest in a project, and, before the project does or does not pay off, each group member experiences anticipatory utility based on their degree of optimism and on the beliefs of other group members. Under certain adverse equilibria, group members engage in collective denial, ignoring 'red flags' (via inattention, misinterpretation, and forgetting) so as to maintain the collective illusion that an unfavorable project will, in fact, succeed.

Attention effect: New information tends to be surprising, which means that it has a disproportionate impact on utility (Golman and Loewenstein, 2015*a*; Karlsson, Loewenstein

and Seppi, 2009). If information is expected to be adverse, therefore, people may have an incentive to avoid it. To know something bad, at least in the short run, tends to be worse than only to suspect it. (In the long run, however, knowing can be better, if it enables an individual to adapt to adverse circumstances (see Smith et al., 2009).)

Karlsson, Loewenstein and Seppi (2009) propose a model in which news about one's investment portfolio, relative to lagged expectations, has a greater impact on utility when one is attentive. Given the lag in updating one's expectations, there is a motive to be inattentive when the investor suspects that the news from looking would likely be unfavorable. In that paper the authors present empirical data on the frequency of logins to personal investment accounts when the broad market shows gains vs. losses. When markets overall go up, then it is likely that individual stocks held by investors have appreciated as well. In that case, logging on to check one's savings is likely to present good news. On the other hand, if the market has declined, then bad news is more likely to await. Investor behavior is consistent with a desire to avoid bad information: investors are more likely to log in on days when the market went up. In doing so, they avoid information about current losses that may be relevant to their trading strategy.

A follow-up paper analyzing a very large sample of individual 401k investors over a two-year period (Sicherman et al., 2015) provides additional insights. Reminiscent of Köszegi's (2003) prediction that patients facing worse outcomes (who, arguably, need the information most) are least likely to seek a diagnosis, investors with large holdings are more likely to avoid information. This information avoidance is a product of stable character traits; investors who are ostriches in 2007 also tend to be ostriches in 2008 despite dramatically different market conditions. The authors' analysis of multiple logins on weekends is also quite revealing. Second and further logins provide no new information because the market is closed and the portfolio information is not updated on the web, so the main purpose of such logins appears to be to 'savor' the information by paying attention to it, much as a child might shake a coin-packed piggy-bank. Indeed, these non-informative logins display an even stronger ostrich pattern than do logins during the week.

Golman and Loewenstein (2015*a*) propose a model of information acquisition and avoidance in which information is surprising to the extent that it generates more drastic revisions of beliefs. Surprise produces a short-run boost in the attention devoted to these beliefs, and in turn, these beliefs have a greater im-

pact on one's utility. Thus, information that is expected to produce negative beliefs can lower one's utility even though a prior expectation of a negative outcome was already a source of disutility. When there is a suspicion that the news revealed by information might be undesirable–for example, teaching ratings when a course seems to have gone badly, or the value of one's own portfolio when one learns from the news that the market has fallen–people will be motivated to avoid getting this information to avoid the increase in attention, and hence weight in utility, that is likely to accompany its receipt.

Empirical studies provide support for an attentional mechanism underlying avoidance of information when bad news is suspected. Miller (1987) finds that many individuals (identifiable through self-reports) distract themselves from threatening information, for example, about an impending electric shock (as in Averill and Rosenn, 1972) or about warning signs of poor academic performance. Falk and Zimmermann (2014) show that people are more inclined to avoid information about whether they will be receiving electric shocks (clearly bad news if they are) when they can distract themselves by playing a quiz game.

Belief investments: Many of the varieties of hedonically-driven information avoidance involve a motive to not form, or focus on, an unpleasant belief. While some beliefs are intrinsically unpleasant–e.g., believing that one has contracted a serious disease–others are unpleasant because an individual has committed himself to an opposing belief. In many situations people invest time, money or effort–often very large amounts–based on beliefs. For example, a devout Catholic will spend large amounts of time going to church, money supporting the church, and effort complying with its doctrines. In such situations, information that could potentially challenge the beliefs underlying the investments threatens the investments themselves. If the down-side risk that new information could undermine beliefs is greater than the up-side potential for beliefs to be bolstered (which is likely in a wide range of situations), people may choose to avoid information. Bénabou and Tirole (2011) propose that people use these investments to signal their own core values and social identities to themselves. Avoiding information that would threaten one's conception of his own identity helps a person continue to enjoy his sense of self and to preserve his motivation to live up to his ideals. Golman et al. (2015) follow Bénabou and Tirole in adopting the basic premise that people become attached to their belief investments. They propose that people avoid information that would conflict with be-

liefs they have invested in because they experience a kind of sunk-cost bias and do not want to consider that their existing beliefs might be wrong.

In a New York Times column titled "In College and Hiding From Scary Ideas," Judith Shulevitz recounts a story about a campus sexual assault debate that took place at Brown University. Students were provided with a designated "safe space" they could retreat to if they found the debate too upsetting. One student attended the debate for some period, but then felt that she had to return to the safe space, recounting to Shulevitz that "I was feeling bombarded by a lot of viewpoints that really go against my dearly and closely held beliefs."[2]

2. *Strategically-driven information avoidance*

By strategically-driven information avoidance we mean avoidance of information for the purpose of steering one's own behavior, or that of others, in a self-interested direction. Surprisingly, as we discuss in the ensuing subsection, some of these situations arise with single individuals–i.e., in the absence of interpersonal interactions.

INTRAPERSONAL/STRATEGIC

Information avoidance as a commitment device: Wakker (1988) illustrates how decision makers whose preferences do not conform to expected utility could recognize that resolution of the first stage of a compound lottery would shift their preference for accepting or rejecting another lottery in the second stage, and, if they are sophisticated about this preference reversal, might choose to avoid information about the outcome of the first lottery to commit themselves to their plan for the second lottery. In this situation, information avoidance is a kind of internal commitment device to deal with incoherent risk preferences.

Information avoidance can be used as a commitment device for other self-control problems as well, assuming a person is sophisticated about having time inconsistent preferences (Carrillo and Mariotti, 2000). It can be used to prevent oneself from reconsidering decisions in the future when one might otherwise succumb to temptation. For example, non-smokers who are aware that nicotine is addictive but who overestimate the health risk it poses might avoid information that makes them reconsider these risks for fear that it would tempt them to start smoking and be unable to give up the costly habit (Carrillo and Mariotti, 2000).

Motivation maintenance: In some cases

[2] http://www.nytimes.com/2015/03/22/opinion/sunday/judith-shulevitz-hiding-from-scary-ideas.html

people avoid information out of fear that some types of information they might obtain would be demotivating. For example, an athletic competitor might avoid obtaining information about competitors for fear that such information might make it difficult for them to maintain the enormous motivation required to train. Bénabou and Tirole (2002) suggest that, due to present-bias, people have a natural tendency to put too little effort into tasks with high but delayed payoffs, and avoid information about their own true ability so as to maintain overconfidence for the purpose of offsetting this motivational deficiency. By similar logic, to the extent that extreme levels of motivation can in some cases undermine performance (see, e.g. Ariely et al., 2009), one could imagine situations in which people might avoid information to prevent themselves from becoming excessively motivated. A novice teacher, for example, might avoid looking at teaching ratings not (only) out of fear that the information would make them miserable but also out of fear that the information might lead to counterproductively high levels of anxiety about teaching.

Avoiding projection-biases: In some situations, such as teaching or strategic interactions, it is useful for an individual to guess what other individuals will believe. For example, the seller of a defective product, in setting a fixed price, would like to know whether potential buyers will notice the product's limitation. In such situations, research has documented a phenomenon in which better informed individuals 'project' their superior knowledge on less well informed individuals. Because this "curse of knowledge" (Camerer, Loewenstein and Weber, 1989) distorts individual judgments and is generally detrimental to the individual, people should be (and sometimes are) motivated to avoid information to avoid being 'cursed.' There is, however, evidence that people do not appreciate how information can distort these types of judgments, and hence obtain, and even pay for, information when, in fact they would be better off if they did not (Loewenstein, Moore and Weber, 2006). Information avoidance for the purpose of lessening projection bias is, therefore, a theoretical possibility, but there is little if any evidence that people actually avoid information for this reason.

Abdicating responsibility: In some situations, people may not want to obtain information because they fear that obtaining it will make them more culpable for ethically questionable behavior, leading to self-condemnation or condemnation (and possibly apprehension and punishment) by others. According to the concept of 'moral wiggle room', people are not necessarily inherently

altruistic, but like to appear so, possibly not only to others but also to themselves (Dana, Weber and Kuang, 2007; see, also, Broberg, Ellingsen and Johannesson, 2007; Dana, Cain and Dawes, 2006; Grossman, 2014; Lazear, Malmendier and Weber, 2012). When they can interpret a situation in a fashion that allows them to behave selfishly without compromising their identity as moral people, they will do so and behave selfishly (Shalvi et al., 2015). Thus, when people have the types of complex motives inherent in the concept of moral wiggle room, they may similarly be motivated to avoid information.

Consider, for example, the payoff matrix in Table 1 (from Dana, Weber and Kuang, 2007), in which a 'dictator' chooses between A and B. In one of the experiments reported in their paper, subjects played this game, but the recipient's payoffs were hidden. However, dictators had the options to costlessly and privately reveal the recipient's payoff. This would be valuable information for someone with other-regarding preferences or with preferences for efficiency, but could make the decision more difficult for a dictator who wanted to maximize her own payoff while minimizing guilt. Consistent with a desire to avoid the information, only 56 percent of dictators chose to reveal the recipient's payoff, and more dictators chose the "selfish" payoff than in the corresponding game in which the recipient's payoffs were revealed by default. Decision makers are sensitive to the cost of being prosocial and are more likely to reveal the state when the kind action is cheap. However, making the selfish action costlier to the recipient does not affect the decision to reveal (Van der Weele, 2014).

TABLE 1—THE DICTATOR KNOWS HIS OWN PAYOFFS AND CAN CHOOSE TO COSTLESSLY REVEAL HIS PARTNER'S PAYOFFS, WHICH DEPEND ON THE STATE.

		State	
		I	II
Choice	A	6,1	6,5
	B	5,5	5,1

Similarly, people with social preferences may not want to hear that a possible action that would entail a personal cost would have greater benefits to others. With this information, their preferences may compel them to take the action, i.e., to give others these benefits, leaving them off worse overall than had they not known (Nyborg, 2011; Andreoni, Rao and Trachtman, 2011). Naturally, consumers buying products have opportunities to learn about environmental and labor practices of producing firms. There may, however, be little upside from learning that best practices have been adhered to, whereas finding out that the firm engages in bad practices would impose disutility from the purchase or use of the

product. Paharia, Vohs and Deshpandé (2013) find, in a hypothetical scenario study, that consumers use moral disengagement to justify purchasing items manufactured using sweatshop labor, suggesting that this information is indeed unpleasant. Consequently, people may rationally avoid finding out this information in the first place and may even be willing to pay to avoid it (Ehrich and Irwin, 2005; Grossman and van der Weele, 2013). The same principle appears in charitable giving: donors may want to avoid information about a charity's effectiveness to avoid learning that their contributions do not have the impact they imagine (Niehaus, 2013).

Grossman and van der Weele (2013) propose a theoretical model in which decision makers avoid information so as to weaken the signal that their choice in the dictator game will send about their own prosociality. Avoiding information itself sends a signal, but doing so is less informative than choosing the selfish action after having obtained the information. They make and find evidence for five predictions about moral wiggle room: (1) there is a smaller incentive to act pro-socially when there is initial uncertainty about others' outcomes; (2) those who are acting selfishly are more likely to not obtain the information; (3) selfish actions are judged more harshly if actors acted selfishly knowing the other's payoffs than if they chose to remain ignorant; (4) more people will choose to obtain information after having made the decision as dictator than before (as obtaining the information after the decision does not send a bad signal); and (5) decision makers who choose to avoid the information and are selfish are willing to pay to remain ignorant.

People about to succumb to a temptation may also avoid information that could make them feel guilty about succumbing or even dissuade them from doing so. In a state of craving, an individual may choose not to learn about the long-term health consequences of indulging in the desired behavior. For example, cigarette smokers who are not motivated to quit might prefer to not know about the health risks associated with smoking. By the same token, a hungry diner who wants to enjoy a high-calorie meal might well choose not to obtain nutritional information before ordering (Loewenstein and O'Donoghue, 2006). In such a situation, imposing this information via prominent calorie displays may detract from the diner's welfare.

Saving it for later: Strategic information avoidance is a device to influence the action taken at time t=1. An interesting case arises when the decision at this later time is once again whether to acquire or avoid the information. If information will be even more plea-

surable to discover at a later time, an individual may strategically save it (e.g., ask others not to spoil the ending of a good book or show.) Such a motive requires contextual reasons why the information will be more valuable in the future than in the present. One possible reason could be that delayed information will come along with other pieces of information, and that these pieces of information are complements. Kocher, Krawczyk and van Winden (2014) show that lottery players enjoy spreading out drawings (not immediately finding out whether they've won each drawing) so they can savor thoughts of possibly winning (though, unsurprisingly, people do not enjoy spreading out information about whether they will be forced to receive electric shocks; Falk and Zimmermann, 2014). Another reason may be that not knowing creates suspense, thus enhancing the experience of discovering information (Ely, Frankel and Kamenica, 2015). Someone watching a recorded soccer game, for example, may not want to know when goals were scored, as that would make the ultimate outcome of each play predictable. In these cases, avoiding information at time 0 increases the utility of acquiring that information at time t.

INTERPERSONAL/STRATEGIC

In interpersonal interactions, information may be avoided in public as a strategy for manipulating another player's actions. This can take a variety of forms. In some cases, obtaining information may make it publicly available to others, which could be problematic (e.g. a charity allowing outside researchers to assess its effectiveness). In other cases, an individual may make it known that he will not obtain private information as a kind of commitment device, so that other players cannot rely on his knowledge of this information in their own actions. This commitment to an ex-post suboptimal course of action can change the optimal strategy for others and lead to a better outcome for the individual (much like the decision to remove the steering wheel in a game of chicken serves as a commitment device and all but guarantees victory).

Strategic motives to avoid public information: It is not surprising that both people and firms occasionally have information that they would prefer not to spread, and sometimes the only way to prevent information from being publicly released is to not acquire the information in the first place.

Anybody might avoid public information that is potentially damaging. For example, tobacco company executives might not want to commission studies of the health impacts of smoking, recognizing that such investigations could only hurt, but not help, their sales. Similarly, a presidential candidate might prefer not

to know whether an employee (already) working for him has illegally entered the country (making the employment illegal as well), as there would be a scandal if the public found out about any wrongdoing, and there would be little to gain by confirming responsible behavior in any one particular instance. An individual taxpayer who honestly believes he is entitled to a tax deduction might choose not to consult with an accountant who could only talk him out of taking the deduction. Often the law encourages such behavior by holding a person criminally responsible for negligence only if the person knows or could reasonably be expected to know of a danger. Examples abound in which the motive to hide damaging information from others is stronger than the motive to find out for oneself.

Rayner (2012) illustrates avoidance of uncomfortable information in a pollution mitigation program in the Chesapeake Bay. As part of the program, a complex computational model of the environment was built to assess the impact of environmental protection interventions. Although the model showed continued improvement in water quality, actual water samples showed no discernable change. Little attention and funding was, however, directed at field measurements that could confirm the program's ineffectiveness; instead improvements in the model became the benchmark for the program's success.

Along similar lines, individuals or firms might avoid public information that would allow others to gain at their expense. For example, an expert forecaster might avoid information about statistical correlates of his predictions so that other experts could not imitate his methods. Similarly, a firm might avoid collecting information that it does not want others to know because it may lead rivals to intensify competition. This could be the case if rival firms could learn how to copy a leader's new technology or if the information could provide a duopolist with an incentive to compete rather than to collude (Mirman, Samuelson and Schlee, 1994).

Two or more parties who engage in risk sharing might avoid public information about the hazard to preserve their risk-sharing arrangement. There are several situations in which weakly risk averse agents would like to agree to a state-contingent contract so that no single risk averse agent needs to bear all of the environmental risk, but if any party were to discover ahead of time whether and/or when the hazard would in fact occur, that party would be unwilling to agree to contracts that would turn out to be ex-post losses, and the entire arrangement would unravel (Green, 1981; Hirshleifer, 1971; Schlee, 2001). For example, consider adverse selection in a health in-

surance market such that some people may be unable to obtain insurance if anybody acquires private information (Rothschild and Stiglitz, 1997). Suppose it would be economically efficient for individuals to purchase health insurance from a cooperative with many members, and suppose that the insurance cooperative does not cover pre-existing conditions in order to avoid the adverse selection problem. Individuals might rationally choose not to go to a medical clinic for a (free) test and diagnosis before signing up for insurance, knowing that if the test were to come out positive they would be unable to get medical coverage for the condition through their insurance policy.

Strategic motives to publicly avoid private information: Game theory tells us that there can be strategic motives to publicly avoid private information because a player may benefit if another knows that he is ignorant.

Avoidance of information can strengthen one's bargaining position (Schelling, 1956). The intuition for real-world bargaining situations is that information avoidance supports a kind of brinkmanship, which forces the other party to make (or accept) a higher (lower) offer. For example, labor union leaders aware (but, of course, not sure) that their rank and file members might be growing weary of a strike could publicly avoid meeting with them to credibly convey to management that the union has no intention to end the strike and that management will have to make a better offer to resolve the dispute. Lab studies have documented that people engaged in ultimatum bargaining avoid information to induce the other party to accept a proposal that he would not have accepted otherwise (Conrads and Irlenbusch, 2013) and that people engaged in sequential Nash bargaining avoid information to induce the other party to propose a more generous offer than he otherwise would have (Poulsen and Roos, 2010). Theoretical modeling suggests that strategic bargainers could use a strategy of information avoidance also to induce another party to invest in increasing the surplus being bargained over (Gul, 2001).

In theory, if both parties were sophisticated, they could also publicly avoid acquiring asymmetric information that would break the other party's trust that they could get a fair deal. For example, a casino could promise to shuffle its cards in real time rather than to use a pre-shuffled deck so that players would know that the casino could not know the deal ahead of time, in order to convince patrons that they can get a fair game at that casino. Alternatively, if adverse selection does not destroy the market, information avoidance can also allow a player to take advantage of an existing information asymmetry. Kessler (1998) shows that a contractor may strategically avoid informa-

tion to exploit private information and extract higher rents from a contract.

A commitment to avoid private information can also be used to claim some market power. Caillaud and Rey (1994) show that producers may gain market power by strategically avoiding information about the retailers who sell their products. Roesler (2015) shows that a consumer may strategically avoid certain information about a monopolist's product, effectively committing to buying the product even with a low ex-post valuation, in order to drive down the monopolist's price. Crémer (1995) and Dewatripont and Maskin (1995) show that information avoidance can be a useful commitment device in repeated contracting in order to prevent unfavorable renegotiation when the initial contract opens up again.

Principal-agent problems arise when one party (the principal) finds it difficult to incentivize another, more informed party (the agent) to act on his behalf. In theory, avoiding information about the agent's action could sometimes be a wise strategy for the principal to improve the agent's incentives (Prat, 2005). A manager might, for example, avoid information that a subordinate collects in order to make a commitment not to micromanage the subordinate, if the subordinate would be more motivated with the power to make decisions on his own (Aghion and Tirole, 1997; Dominguez-Martinez, Sloof and von Siemens, 2014). Schmidt (1996) even suggests that governments may privatize (or choose not to nationalize) firms in order to avoid information about their operations, as part of a commitment not to rescue failing firms that is intended to push the firms' managers to behave more responsibly.

3. Consequences of information avoidance

Beneficial and counterproductive effects on decision making: Perhaps the most general and obvious consequence of information avoidance is that it robs people of potentially useful information that could be used to enhance decision making. For example, teachers who fail to read teaching evaluations will not obtain feedback that could, potentially, improve their teaching. Likewise, stock market investors who do not look up the value of their portfolio when the market is down deprive themselves of potentially useful information. Yet, it is possible that asymmetric look-ups occur for a good, intrapersonal-strategic, reason: perhaps investors are aware of their own predilection for panicking and selling at the bottom of the market; if so, then ignoring information could actually improve investor returns (see Sicherman et al., 2015, for a detailed discussion of this issue). More generally, in evaluating whether information avoidance produces a net welfare gain or loss,

one needs to take account of the fact that people avoid information for possibly very good reasons. The hedonic consequences of information acquisition or avoidance, in particular, should be part of any welfare calculation. Caplin and Leahy (2004), Schweizer and Szech (2013), and Lipnowski and Matheevet (2015) recognize this in proposing mechanisms for the optimal provision of information to patients with anxiety.

Groupthink: When decisions are made in groups, information avoidance can play an especially pernicious role, not only because the most important decisions tend to be made by groups but also because interpersonal interactions can magnify motives leading to information avoidance. Bénabou (2013) provides an elegant model of such effects in a paper on "groupthink," a phenomenon first identified and discussed by (Janis, 1972). Bénabou (2013) also draws a link between groupthink in organizations and collective delusions in markets that can lead to irrational exuberance, bubbles, and panics (Kindleberger, Aliber and Solow, 2005; Reinhart and Rogoff, 2009; Shiller, 2005).

Confirmation bias: As already noted in the section on information avoidance via distorted processing of information, confirmation bias (Nickerson, 1998) is an important phenomenon that is associated with, and partly the result of, selective exposure to (and avoidance of) information (Jonas et al., 2001). Research on managerial decisions finds that managers avoid exposing themselves to arguments that would conflict with their preliminary decisions (Schulz-Hardt et al., 2000). Managers in German firms who were recruited for a lab experiment were given a hypothetical case about a firm considering relocation. They were presented with an equal number of arguments in favor and against the move and asked to make a decision on their own. They were then split into groups of five, based on their individual decision: groups consisted of people who either all made the same decision, or in which a minority of one or two participants chose differently. Participants were then given the option to receive additional arguments, up to five in favor and five against, with the condition that everyone in the group had to read the chosen arguments. Although the information was costless, the expected effort to read the information imposed a cost that gave participants an excuse for being selective. All groups chose to obtain more information that conformed to the majority's view than that conflicted with it. Moreover, this difference was greatest in groups in which everyone held the same view, less pronounced in groups with a one-person minority, and was even lower in groups in which two people held

the minority view. These findings suggest a tendency to avoid information that might conflict with prior decisions, even though such information might well be viewed as especially valuable since it could lead to a warranted reversal of the decision. Information confirming a decision, in contrast, is unlikely to influence the decision, especially in a homogeneous group.

Confirmation bias has diverse negative manifestations, including scientific atrophy when scientists fail to challenge their own beliefs or to update them in response to valid challenges from others. As Max Planck noted, "a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it." Researchers suffering from confirmation bias may rationalize failed experiments, attributing them to chance or flawed design, and repeat similar experiments until they "work," and then conclude overconfidently that their initial hypotheses are correct. This is a recipe for producing invalid scientific conclusions (see Simmons, Nelson and Simonsohn, 2011).

Media bias: If people eschew information that threatens their existing beliefs and demand only information that supports these views, it is only natural for the media to supply precisely the information they demand. In the competition for more readers and viewers, media outlets have an incentive to provide biased coverage that aligns with the perspective of their target audience. In his book Republic.com 2.0, Sunstein (2007) notes that the internet holds great promise as a democratizing technology by enabling the dissemination of a greater diversity of information than was previously possible. Yet, he points out, the greater diversity of information also makes it possible for people to selectively expose themselves to perspectives that accord with, and rarely challenge, their existing views, and he cautions against "the risks posed by any situation in which thousands or perhaps millions or even tens of millions of people are mainly listening to louder echoes of their own voices." Supportive of Sunstein's concerns, Gentzkow and Shapiro (2010) find that newspapers readers are more likely to demand news slanted toward their own political ideology, and that firms respond strongly to readers' preferences (for a subtly different perspective, see Garrett, Carnahan and Lynch, 2011). Similarly, users of social networks are more likely to be exposed to (and click through to) news stories congruent with their political beliefs than cross-cutting content (Bakshy, Messing and Adamic, 2015).

Political polarization: Closely related to,

and both derivative of and contributing to, the problem of media bias, is that of political polarization. Such polarization occurs not only because people selectively attend to media that supports their pre-existing opinions, but because they engage in a wide range of behaviors that contribute to selective exposure to information. A recent trend in the United States provides striking evidence of values-based residential segregation. As The Economist[3] reports it: "Americans are increasingly choosing to live among like-minded neighbors... Some folks in Texas recently decided to start a new community 'containing 100% Ron Paul supporters'." (Ron Paul is a staunch libertarian and was a Republican presidential candidate in the 2008 race.) A recent book, The Big Sort, (Bishop and Cushing, 2008) documents that the Ron Paul community is only one example of a more general trend for Americans to form like-minded clusters.

Even when people cannot avoid encountering other people they disagree with, they can avoid having conversations that bring out such differences. Sugden (2005, pg. 67) provides an elegant description of the phenomenon of "conversational minefields" whereby "different topics are gradually introduced into the conversation, exploiting connections with what has already been said, with the general aim of finding a topic on which the two partners have common opinions or beliefs. If a topic begins to provoke disagreement, it is dropped."

While avoiding contrary information may lead to polarization, (Druckman, Peterson and Slothuus, 2013) show that polarization can lead back to information avoidance. In a polarized environment, partisan cues drown out reasoned arguments. People not only form opinions based on weaker evidence; they also believe that the arguments endorsed by those holding their position are in fact stronger, so they rationalize not listening to opposing arguments.

Climate change denial: One polarizing issue of special importance, given the threat it constitutes to humanity, is climate change. Although the vast majority of scientists believe that climate change is real, caused by humans, and could potentially be mitigated by a concerted human response, vast numbers of individuals on the right of the political spectrum in the U.S. reject these conclusions. Rejection of the reality of climate change makes it difficult if not impossible for the U.S., which was until recently the world's largest emitter of greenhouse gases, to enact policies to reduce such emissions. Rejection of a scientific consensus almost by definition requires infor-

[3] 2008. "Political segregation: The Big Sort." The Economist, June 19. http://www.economist.com/node/11581447

mation avoidance. Kahan, Jenkins-Smith and Braman (2011); Kahan et al. (2012) find that people with different political positions and cultural values individualists compared with egalitarians, for example disagree sharply about how serious a threat climate change is, and that both groups tend to denigrate research that contradicts their views. For example, presented with a PhD scientist who is a member of the US National Academy of Sciences, climate believers and deniers will disagree about whether he really is an 'expert', depending on whether his view matches their own (Kahan, Jenkins-Smith and Braman, 2011). Surprisingly for believers, belief in climate change bears no connection to an individual's level of scientific literacy or expertise (Kahan et al., 2012). Kahan provides a kind of rational account of such polarization, pointing out the tremendous costs that an individual would bear for deviating from the dominant views of the group within which they are embedded. As a result, as summarized in a recent Nature column summarizing on Kahans work, "social science suggests that citizens are culturally polarized because they are, in fact, too rational at filtering out information that would drive a wedge between themselves and their peers."[4]

In a book about climate change denial aptly (for the theme of this review) titled *Don't Even Think About It*, George Marshall (2014) seeks to make sense of why the nations of the world are largely ignoring an unfolding problem that threatens to immiserate even generations alive today. Much of his explanation for the riddle involves information avoidance–e.g.,

> The bottom line is that we do not accept climate change because we wish to avoid the anxiety it generates and the deep changes it requires. In this regard, it is not unlike any other major threat. However, because it carries none of the clear markers that would normally lead our brains to overrule our short-term interests, we actively conspire with each other, and mobilize our own biases to keep it perpetually in the background (page 228).

Spread of disease: Avoidance of medical testing about contagious diseases, such as AIDS, can contribute to the spread of these diseases. While an individual may choose to avoid testing–perhaps rationally, given hedonic considerations (Brashers, Goldsmith and Hsieh, 2002)–out of fear of getting a positive diagnosis, this kind of information avoidance imposes a negative externality on others. An untested individual may fail to take precau-

[4] http://www.nature.com/news/why-we-are-poles-apart-on-climate-change-1.11166

tions that prevent the spread of the disease to others, and societal welfare could be lower due to this information avoidance (Caplin and Eliaz, 2003).

4. Final Comments

Since George Stigler pioneered the economic analysis of information, we have become used to thinking of information as a means to a (typically material) end. Information is seen as valuable to the extent, and only to the extent, that is enhances decision making. Among the stylized assumptions of economics, this may be one of the most unrealistic, and most consequential.

Considerable research in economics, psychology, and neuroscience points to the conclusion that people derive utility not only from possessions and experiences, but also from beliefs. Seminal early contributions to this perspective include Thomas Schellings 1987 paper "The Mind as a Consuming Organ," and a 1986 paper by the psychologist Robert Abelson titled "Beliefs are Like Possessions." Neuroscience research (e.g. Knutson and Peterson, 2005) shows that people derive immediate utility–pleasure and pain–from learning about gains and losses, and also provides strong support for the reality of anticipatory utility (Berns et al., 2006; Loewenstein, 1987). Research on topics such as ego, meaning, framing, and mental accounting provides further support for a point that should perhaps be seen as obvious: most of what matters happens 'inside our heads', and, given that there are often multiple ways to interpret the same piece of information, how we construe information is often as important as the objective content of the information. The burgeoning economic literature dealing with belief-based utility (e.g. Geanakoplos, Pearce and Stacchetti, 1989; Caplin and Leahy, 2001; Köszegi, 2010; Golman and Loewenstein, 2015*b*) suggests that economists are beginning to grapple with these complexities.[5]

Information avoidance provides a superb lens into the true complexities of consumption in the mind. On the one hand, people avoid information for conventional economic reasons: for strategic purposes that promote material outcomes. But people also avoid information for reasons not well captured by conventional economic analysis. In some cases they avoid information to, in effect, license them to behave as they would really like to behave–providing 'plausible deniability' of unethical behavior not only to other people but also to themselves. Even more tellingly, people often avoid information simply because the information would make them feel bad–because information carries direct, and often negative, utility.

[5]Psychologists have a longer tradition of recognizing information avoidance (see Sweeny et al., 2010).

As we have shown, there are many streams of research in both economics and psychology that either directly address or can be connected to information avoidance. Given the diverse mechanisms leading to information avoidance, literature on the topic has not been structured as a coherent body; nor we suspect can it or should it. Given the important consequences of information avoidance, however, research on the mechanisms that produce it could have immediate and important policy applications–e.g., in encouraging at-risk individuals to test frequently for HIV, or in overcoming resistance to confronting the scientific evidence on climate change. We hope that this review will not only help to introduce a relatively unknown topic to economists, but will help to inspire new lines of theoretical and empirical investigations.

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