Psychological Review
2017, Vol. 124, No. 2, 179–196

0033-295X/17/$12.00 http://dx.doi.org/10.1037/rev0000055

Cassandra's Regret: The Psychology of Not Wanting to Know

Gerd Gigerenzer
Max Planck Institute for Human Development, Berlin, Germany

Rocio Garcia-Retamero
University of Granada

Ignorance is generally pictured as an unwanted state of mind, and the act of willful ignorance may raise eyebrows. Yet people do not always want to know, demonstrating a lack of curiosity at odds with theories postulating a general need for certainty, ambiguity aversion, or the Bayesian principle of total evidence. We propose a regret theory of deliberate ignorance that covers both negative feelings that may arise from foreknowledge of negative events, such as death and divorce, and positive feelings of surprise and suspense that may arise from foreknowledge of positive events, such as knowing the sex of an unborn child. We conduct the first representative nationwide studies to estimate the prevalence and predictability of deliberate ignorance for a sample of 10 events. Its prevalence is high: Between 85% and 90% of people would not want to know about upcoming negative events, and 40% to 70% prefer to remain ignorant of positive events. Only 1% of participants consistently wanted to know. We also deduce and test several predictions from the regret theory: Individuals who prefer to remain ignorant are more risk averse and more frequently buy life and legal insurance. The theory also implies the time-to-event hypothesis, which states that for the regret-prone, deliberate ignorance is more likely the nearer the event approaches. We cross-validate these findings using 2 representative national quota samples in 2 European countries. In sum, we show that deliberate ignorance exists, is related to risk aversion, and can be explained as avoiding anticipatory regret.

Keywords: anticipatory regret, deliberate ignorance, risk aversion, insurance

> Now once again the pain of grim, true prophecy shivers
> my whirling brain in a storm of things foreseen.
> Cassandra in *The Oresteia* (Aeschylus, trans. 2013, pp. 1215–1216)

According to Greek mythology, Apollo granted Cassandra, daughter of the king of Troy, the power of foreseeing the future. Yet after his failed attempt to seduce her, he placed a curse on her so that her prophecies would never be believed. Cassandra foresaw the fall of Troy, the death of her father, the hour of her own death, and the name of her murderer. To helplessly watch the approach of future horrors became a source of endless pain, suffering, and regret of her terrible solitary knowledge.

Unlike Cassandra, much of philosophy and psychology has assigned categorically positive value to the power of knowing and predicting the future. "All men by nature desire to know"— so began Aristotle his *Metaphysics* (trans. 1953). John Locke (1690/1828) listed ignorance as the first cause of wrong judgment: "He that judges without informing himself to the utmost that he is capable, cannot acquit himself of *judging amiss*" (p. 178). One of the founders of 20th-century cognitive psychology, George Miller (1983), proposed that just as the body survives by ingesting negative entropy, so the mind survives by ingesting information. This view of *Homo sapiens* as informavore underlies various motivational concepts, including *ambiguity aversion* in decision research (Hogarth, 1987) and *need for closure* (a measure of an individual's desire for firm answers to questions) in social psychology (Kruglanski & Webster, 1996). It is also reflected in the business of buying and selling predictions that began centuries ago with divination, astrology, and stock prediction, and continues today with big data and state Total Information Awareness programs.

Yet it has not gone unnoticed that people *sometimes* do not want to know. In "Blowin' in the Wind," Bob Dylan (1963) asked: "How many times can a man turn his head, pretending he just doesn't see?" Medical researchers asked why some 10% of Canadian adults with a family history for Huntington Disease (HD) chose not to have the linkage test (a predictive test for HD; Babul et al., 1993), or why 20% of Malawi adults at risk for HIV chose not to learn about the results of an HIV test even when offered monetary incentives (Thornton, 2008). Like Dylan, medical researchers often link not wanting to know with self-deception, dishonesty, and shirking responsibility.

Technological progress steadily shifts the line between the knowable and the unknowable in the direction of Cassandra's powers. Advances in genomic analyses and biomarker research will put more and more people into situations where they have to decide whether they want to know future health issues. Clinics already offer prenatal and newborn screening tests for dozens of genetic or metabolic abnormalities, and people can have their entire genome analyzed. Researchers report having identified biomarkers that help in predicting when a person will die and from what cause (e.g., Cawthon, Smith, O'Brien, Sivatchenko, & Ker-

Gerd Gigerenzer, Center for Adaptive Behavior and Cognition, Max Planck Institute for Human Development, Berlin, Germany; Rocio Garcia-Retamero, Department of Experimental Psychology, University of Granada.

We thank Ralph Hertwig, Shenghua Luan, Lael Schooler, Peter Todd, and Rona Unrau for helpful comments. This research was in part funded by the Ministerio de Economía y Competitividad (Spain) (PSI2014-51842-R).

Correspondence concerning this article should be addressed to Gerd Gigerenzer, Center for Adaptive Behavior and Cognition, Max Planck Institute for Human Development, Lentzeallee 94, 14195 Berlin, Germany. E-mail: gigerenzer@mpib-berlin.mpg.de

ber, 2003; Fischer et al., 2014; Morini, Sangiuolo, Caporossi, Novelli, & Amati, 2015); others claim to have developed tests that predict with high accuracy whether and when a couple will divorce (Gottman & Levenson, 2000). But would you want to know during the wedding ceremony whether your marriage is going to end in divorce? Unlike Cassandra, who was both empowered and condemned to foresee the future, we increasingly often have a choice.

This article makes a theoretical and empirical contribution to better understanding the conflict between wanting and not wanting to know. We first define the phenomenon of *deliberate ignorance*, provide a *regret theory* of the underlying conflict, and derive predictions. The regret theory integrates work on regret in decision theory (e.g., Luce & Raiffa, 1957) with that on deliberate ignorance (e.g., Sweeny, Melnyk, Miller, & Shepperd, 2010) and clarifies that the reasons why people sometimes do not want to know are not limited to self-deception or moral weakness. Then we present two nationwide representative studies on the actual prevalence of deliberate ignorance in a sample of 10 positive and negative events and test the predictions. By using large-scale samples we provide reliable estimates of the frequency of deliberate ignorance in the general population. All in all, we hope to draw attention to this exception to human curiosity and lay down the foundations for a systematic study of deliberate ignorance.

Definition

We use the term *ignorance* for a state of knowledge in which a person does not know the answer to a question. The question itself is known; thus, we deal here with *known unknowns* but not with *unknown unknowns*, to use the National Aeronautics and Space Administration terminology popularized by former U.S. Secretary of Defense Donald Rumsfeld. The question can be about an event in the past, present, or future, and the answer may be knowable for certain or only with a degree of probability. We use the term *deliberate ignorance* to refer to the willful decision not to know, as opposed to the inability to access information or disinterest in the question. Deliberate ignorance can result from inaction, that is, not searching for diagnostic information, or from action, such as refusing information that someone else offers (Sweeney et al., 2010).

Consider a set of N questions that together with their answers form a knowledge space (Albert & Lukas, 1999). For instance, a man might ask himself whether he actually is the biological father of his child, or whether his marriage might end in divorce. The answer to each question can be represented by a value that can be either qualitative, such as yes/no, or quantitative, such as a point in time or space. The individual knowledge space in Figure 1 contains questions with three kinds of answers: those that are known ("+"), those that are not known ("–"), and those that are not known *and* that the individual does not want to know (black with white minus-sign). There are N_i questions with unknown answers, where the "i" stands for *ignorance*. Among these is a subset of N_{di} questions whose answers an individual does not want to know, where the "d" stands for *deliberat*e. Thus, we speak of *deliberate ignorance* if the following two conditions hold:

1. **Choice of ignorance even when information is free.** The reason for not wanting to know is not search costs; rather, the subset N_{di} is maintained even if search costs are negligible or the information is free.

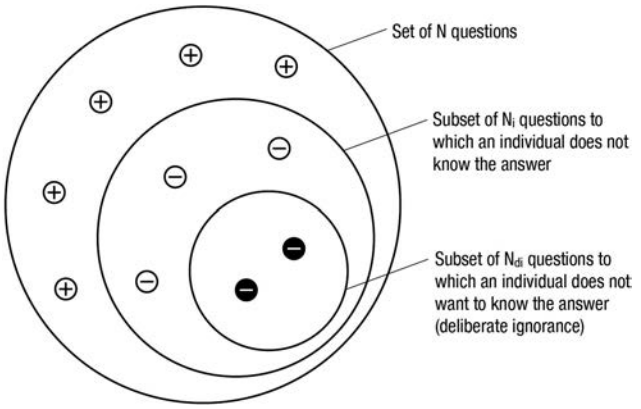

Figure 1. A knowledge space that includes deliberate ignorance. The circles represent N questions of personal interest within an individual's knowledge space. A plus sign means that the individual knows the answer, a minus sign that the individual does not know, and a black circle with a white minus-sign means that the person would not want to know the answer. Deliberate ignorance exists if $N_i \geq N_{di} > 0$. In the illustration, there are two questions to which the person prefers not to know the answer.

2. **Choice of ignorance notwithstanding personal interest.** Nor is the reason indifference to the question; rather, the subset N_{di} consists of questions of significant personal interest.

Condition 1 clarifies that, unlike in economic theories of information search (e.g., Stigler, 1961), cost of information is not at issue. The term *choice* signals that a person can intentionally choose between knowing and not knowing. Thus, deliberate ignorance is not a result of another party withholding information, such as when a physician does not disclose a cancer diagnosis to a patient, but of an individual preferring not to know. Condition 2 excludes ignorance arising from lack of personal interest. For instance, if a person is not interested in foreign politics or has no interest in the results of the next classic car auctions, such ignorance does not qualify as deliberate ignorance as defined here.

Differential Diagnosis

These two conditions clarify that deliberate ignorance should be distinguished from ignorance due to memory limitations and forgetting. Even though forgetting can be beneficial (Schooler & Hertwig, 2005), memory processes are for the most part automatic rather than deliberate. Similarly, deliberate ignorance is not related to search for confirmatory information, as studied in the selective exposure literature, usually grounded in cognitive dissonance theory (see Sweeney et al., 2010). In this research, participants typically have to choose between "consonant" and "discrepant" pieces of information; a review of the selective exposure literature even disqualified all studies that did not follow this procedure (Hart et al., 2009). As in experiments on the confirmation bias (Klayman & Ha, 1987), participants actively search for information, albeit in a biased way, whereas deliberate ignorance refers to avoiding search in the first place.

Finally, the study of willful ignorance differs from the study of *agnotology* (Proctor & Schiebinger, 2008), also called *antiempis-*

temology (Galison, 2004) or *sociology of ignorance* (McGoey, 2014). This field of research investigates the systematic production of ignorance by deflecting, covering up, and obscuring knowledge, such as the tobacco industry's efforts to keep people unaware of the scientific evidence that smoking causes cancer and the production of public ignorance of global climate change. Agnotology looks at how external sources maintain public ignorance, even against people's will; deliberate ignorance, in contrast, entails maintaining personal ignorance.

Motives for Deliberate Ignorance

Why would people not always want to know the answer to a question of personal interest, especially if the answer were for free? We propose to distinguish four motives: to avoid the negative emotions that may arise from foreknowledge of negative events, as in Cassandra's case; to maintain the positive emotions of surprise and suspense; to gain a strategic advantage; and to implement fairness and impartiality (see Figure 2).

The first motive is to avoid potentially bad news, particularly when one has no means of preventing it. For instance, when agreeing to have his genome sequenced, James Watson, the co-discoverer of DNA, stipulated that his ApoE4 genotype, which indicates risk of Alzheimer's disease, be deleted from his published genome sequence and not revealed to himself (Lewis, 2014).

The second motive is to maintain positive emotions of surprise and suspense about personally important events. For instance, some pregnant women feel strongly about not wanting to know the sex of their unborn child in order to preserve suspense and surprise, whereas others feel equally strongly about knowing the sex in order to be able to plan ahead (Shipp et al., 2004).

The third motive is to profit strategically from remaining ignorant. According to Admati and Hellwig's (2013, p. x) analysis of the financial system after the crisis of 2008, willful blindness helps bankers and policymakers ignore the risks in which they engage, deflect criticism, and stall effective reform. Strategic ignorance has been studied in game theory ever since Schelling (1956) challenged the view that the more information one has, such as "insider information," the better one's position in bargaining. The game of chicken is a classic example: A person might walk through the street staring at a smartphone, pretending to be ignorant about the possibility of a collision, meaning that other pedestrians who pay attention will have to bear the burden of avoiding the collision. Here, a deliberately ignorant agent exploits other agents for selfish reasons. Other strategic motives for remaining ignorant include eschewing responsibility and avoiding liability (Hertwig & Engel, 2016).

Finally, deliberate ignorance is used as a device to increase fairness and impartiality. Lady Justice is often depicted wearing a blindfold. In U.S. law, evidence about the defendant's criminal record is typically not admissible, that is, a jury should remain ignorant about previous crimes when determining the defendant's guilt (Hertwig & Engel, 2016). In Japan, the moral principle of turning one's back on evil by remaining deliberately ignorant is embodied at Toshogu Shrine in the carvings of three "wise" monkeys, one covering his eyes, the second covering his ears, and the third covering his mouth. To determine the morality of an issue such as slavery in an impartial way, Rawls (1999) proposed a "veil of ignorance" as a method. Similarly, in the sciences, the double-blind experiment is a device designed to eliminate subjective bias and increase methodological rigor.

In the following, we are concerned exclusively with the first two motives. Although these deal with different emotions, positive and negative, we will integrate them into a common framework by extending Luce & Raiffa's (1957) regret theory to deliberate ignorance.

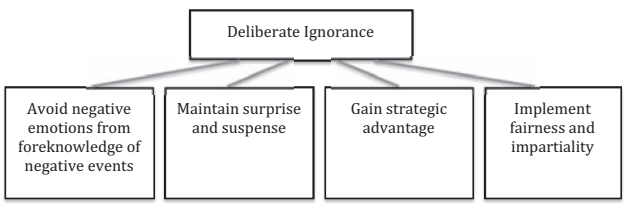

Figure 2. Four motives for deliberate ignorance. The present regret theory integrates the motive of avoiding negative emotions and maintaining surprise and suspense.

A Regret Theory of Deliberate Ignorance

In this article, we propose a theory that assumes that deliberate ignorance is based on anticipated regret. *Regret* is a negative emotion that people may experience *after* choosing Option A (e.g., not buying insurance) and later learning that Option B (buying insurance) would have resulted in a more favorable outcome. *Anticipated regret* is an emotion that occurs *before* the choice has been made. The anticipation that one might regret having chosen an option may itself influence the choice. The role of regret has been acknowledged for some time (e.g., Savage, 1951; Luce & Raiffa, 1957) and has led to models that integrate a regret term into utility theory, typically in the context of choices between gambles (Bell, 1982; Loomes & Sugden, 1982; Mellers, Schwartz, Ho, & Ritov, 1997). In what follows we develop and propose a theory of regret for deliberate ignorance.

We distinguish two options, K (wanting to know) and I (remaining ignorant). Each option is associated with m possible outcomes ($j = 1, \ldots, m$), one of which is the unknown true outcome. Each outcome is associated with a subjective value v_j, which can represent overall life satisfaction, happiness, or benefit. Besides the two general conditions for deliberate ignorance specified above, two additional conditions are required for the possibility of *experiencing regret* (Janis & Mann, 1977; Zeelenberg, 1999):

3. **Feedback.** The true outcome of the foregone option is revealed.

4. **Approach–avoidance conflict.** Knowing the true outcome generates both favorable and unfavorable consequences.

Conditions 1 and 2 define deliberate ignorance in general (for all four motives in Figure 2), and Conditions 3 and 4 further define the domain of the present theory, which deals with the first two motives in Figure 2. The feedback condition is crucial for the possibility of regret. Consider a classical experimental paradigm, where participants have to choose between a certain gain of $50

and a gamble resulting in a gain of \$100 with probability $p = .5$, otherwise nothing (see Table 1). Numerous studies showed that most participants prefer the certain gain of \$50 to the risky game, which has been termed *risk aversion*. Yet this preference is also consistent with avoiding regret. If a person anticipates that choosing the risky gamble might lead to ending up with nothing and to regret for being too greedy, picking the certain option can circumvent regret. If the person chooses the certain option, regret will be impossible because—in the classical experimental paradigm—the foregone risky option is not played out and so the resulting outcome will never be known. Thus, feedback is crucial for generating regret. It is also critical for experimentally separating risk aversion from regret aversion. For instance, Zeelenberg (1999; Zeelenberg, Beattie, van der Pligt, & de Vries, 1996) systematically varied whether feedback was provided in "safer" and "riskier" gambles. Across all experiments, 70% of participants preferred the safer gamble when feedback was given for it alone (as in the classical paradigm), but 60% preferred the riskier gamble when feedback was given only for the latter. This reversal of the majority choice is consistent with the hypothesis of regret aversion, not risk aversion. However, the slightly higher preference for the safer gamble also leaves room for an additional effect of risk aversion.

An approach–avoidance conflict (Condition 4) occurs if the attainment of a goal has both desirable and undesirable consequences (Lewin, 1951). The existence of such a conflict is crucial for understanding the domain of the present theory. According to classical theories of information search, a trade-off exists between the benefits of more information and the costs of further search (e.g., Anderson, 1990; Stigler, 1961). An example is Stigler's theory of constrained optimization, where one stops search (e.g., for a used car) exactly when the costs of further search exceed the benefit of the information acquired. In these theories, knowledge—such as information about further used cars on offer—is assumed to have only benefits, but search always entails costs. This indeed holds for consumer goods and in many other situations. In contrast, the domain of the present theory consists of events where knowing the outcome of an event can also have unfavorable consequences, independent of search costs. That is, the value v_j of knowing outcome j has two components, a benefit v_j^+ and cost v_j^-:

$$v_j = v_j^+ - v_j^- \tag{1}$$

The values v_j^+ and v_j^- are anticipated changes *relative* to the status quo of remaining ignorant, not absolute values or return. The status quo can be seen as a reference point, and the favorable and unfavorable consequences v_j^+ and v_j^- as gains and losses. Table 2 provides an example using the question "*Would you want to know today when you will die?*" For convenience, the timeline is divided into three outcomes, centering on the average life expectancy at birth for males in the United States (which is 76 years; see World Health Organization, 2015). For Option *K*, the values of v_j depend on the outcome, which is revealed as certain or probable. To illustrate, the benefit v_1^+ of learning that one will have a short life (Outcome 1) may include the ability to better plan the remaining short time, whereas the cost v_1^- includes the negative emotions associated with facing early death. The resulting value v_1 can be positive or negative, depending on the balance of benefit and cost. In contrast, the values for *I* are zero, reflecting the status quo of ignorance.

The proposed *regret theory for deliberate ignorance* adapts and extends the framework by Luce and Raiffa (1957, p. 280) from choice between risky and certain monetary gambles to the choice between the Options *K* and *I*. Whereas classical, prospect-based theories assume that the expected utility of an option depends solely on the positive or negative outcomes of this option multiplied by their probabilities, the present theory assumes that choice also depends on the anticipated regret evoked by the outcome of the foregone option (Mellers et al., 1997). The central assumption is that people compare the outcome v_j of the chosen option with the outcome of the foregone option. Because this comparison occurs before the decision of wanting to know is made, v_j represents the *anticipated* value of life satisfaction. Following Luce and Raiffa (1957), we define anticipated regret as the difference between the value v_j and the best value $\max(v_j)$ for the same outcome *j*:

$$\text{Anticipated regret } AR_j = v_j - \max(v_j) \tag{2}$$

Finally, when people decide between *K* and *I*, the theory assumes that they try to avoid the maximum anticipated regret (also known as the *minimax regret criterion*; see Luce & Raiffa, 1957; Savage, 1951):

Minimax: Choose the option that avoids the maximum possible anticipated regret. (3)

We now apply this criterion to the choice between Options *K* and *I*, where all values v_j are relative to the status quo of ignorance and all values for Option *I* are zero. This relative definition of the values simplifies the relation between value and anticipated regret. Let us call v_{max} the outcome with the largest *absolute* value. If v_{max} has a positive sign, then its $AR_j = 0$ for Option *K* (Equation 2), and the decision is to choose Option *K*. If it has a negative sign, the decision is to choose Option *I*, that is, deliberate ignorance. To illustrate: If all values for option *K* in Table 2 are positive, that is, if the benefits of knowing the time of death dominate the negative emotions, then all values for anticipated regret adopting Option *K* are zero, and the decision is to want to know. If all values are negative, reflecting a dominance of negative emotions, then the decision is to not want to know. In this way, Luce and Raiffa's

Table 1
Value and Anticipated Regret in Monetary Gambles

Value v_j	Outcome 1	Outcome 2	Maximum anticipated regret	Decision to avoid maximum regret
Risky option	+100	0	−50	
Certain option	+50	+50	—	Choose certain option

Note. In the first three columns, participants are given a choice between a gain of \$100 with probability $p = .5$, otherwise nothing (risky option), and \$50 for sure (certain option). The anticipated regret (Column 4) is the difference between v_j and the maximum possible gain in the same column, resulting in 0 if Outcome 1 obtains (i.e., no regret) and −50 (regret) if Outcome 2 obtains, which is the maximum anticipated regret for the risky option. When the certain option is chosen, regret is not possible (represented by an em dash) in the standard experimental design because the risky option is not played out. Thus, if the aim is to avoid the maximum possible regret, then the certain option is chosen. To simplify, we assume that the value v_j is the \$ value. Anticipated regret $AR_j = v_j - \max(v_j)$.

Table 2
Value and Anticipated Regret in Deciding Between Wanting to Know (K) and Deliberate Ignorance (I), for Negative Events and Positive Events

		Negative events		
Value v_j	Outcome 1 Short life: <72	Outcome 2 Around life expectancy: 72–80	Outcome 3 Long Life: >80	Decision to avoid maximum regret
Knowing (*K*)	v_1	v_2	v_3	*Choose K if v_{max} is positive*
Not knowing (*I*)	0	0	0	*Choose I if v_{max} is negative*
		Positive events		
	Outcome 1 Home team wins	Outcome 2 Tie	Outcome 3 Other team wins	Decision to avoid maximum regret
Knowing (*K*)	v_1	v_2	v_3	*Choose K if v_{max} is positive*
Not knowing (*I*)	0	0	0	*Choose I if v_{max} is negative*

Note. In the top panel, the example question is, "Would you want to know today when you will die?". Value v_j = anticipated change in life satisfaction after knowing that outcome *j* is true. v_{max} = the value v_j with the largest absolute value. If it has a positive sign, the anticipated regret for option *K* is zero, and *K* is chosen to avoid option *I* with the largest possible regret. If v_{max} has a negative sign, option *I* is chosen. In the bottom panel, the question is, "Would you want to know from a friend how a recorded soccer game ended (as opposed to asking not to tell)?" For positive and negative events alike, the outcome with the largest absolute value determines the maximum anticipated regret and the choice of option (see text).

(1957) regret theory directly translates into a regret theory for deliberate ignorance of negative events. Note that, unlike in the standard experimental design in Table 1, the motive of avoiding the maximum possible anticipated regret can lead to choosing either Option *K* or *I*.

The minimax rule enables decisions to be made in situations where probabilities are difficult to estimate or even change over time (e.g., the probability that one's marriage will end in divorce), unlike in choices between gambles where probabilities are explicitly stated and stable (e.g., Mellers, Schwartz, & Ritov, 1999). In the Discussion section, we outline a possible extension of the regret theory for deliberate ignorance to situations with stable and known probabilities.

Generalization of the Regret Theory to Positive Emotions

Avoiding the negative feeling of regret is not the only motive for deliberate ignorance. Maintaining positive emotions, in particular suspense and surprise, is a second motive (Figure 2; Ely, Frankel, & Kamenica, 2015; Hertwig & Engel, 2016). For instance, some parents do not want to know the sex of their unborn baby in order to maintain suspense and surprise. Similarly, Kruglanski (2004, p. 9) argued that people avoid closure when a task is intrinsically enjoyable and closure threatens to terminate the pleasant activity. We propose that despite this difference in valence, positive emotions can be modeled within the same theory. To adopt the regret theory to surprise and suspense, we need only change the interpretation of the values v_j^- in Equation 1: Instead of reflecting the negative emotions resulting from bad news, they capture the loss of surprise and suspense. As before, all values are relative to the status quo under Option *I*.

Table 2 provides an illustration. Assume you love soccer and video-recorded a game because you could not watch it live. While watching the recording, a friend enters who already knows the result. Would you want to know from the friend how the game ended (as opposed to asking not to tell)? There are three possible outcomes of the game: Your home team won, the teams tied, or the opponent won. Each is associated with a value v_j that reflects a conflict between motives to know the result, such as curiosity, and opposing motives, such as maintaining surprise and suspense. As for negative events, the outcome with the largest absolute value, v_{max}, determines the maximum anticipated regret. If it is positive, that is, if curiosity dominates, the decision is to want to know. If it is negative, reflecting the dominance of surprise and suspense, then the decision is to not want to know. In this way, Luce and Raiffa's (1957) regret theory directly translates into a regret theory for deliberate ignorance of positive events.

The theory proposed here is, to the best of our knowledge, the first theory of deliberate ignorance that deals with both positive and negative emotions. It explains not wanting to know about both negative and undesirable events, such as death and divorce, and positive or desirable events, such as your home team winning a game. According to the theory, deliberate ignorance is not necessarily due to self-deception or other moral weaknesses, as is sometimes suggested in the literature. Rather, it has a dual function: first, to avoid the negative feeling of regret after having learned that an undesirable event is going to happen, as experienced by Cassandra, and second, to maintain the positive feeling of surprise and suspense.

We are now in a position to deduce predictions from the proposed theory. One can test the theory by eliciting subjective values and examining whether these, together with Equations 2 and 3, predict the choice between wanting and not wanting to know. However, such a procedure goes beyond the scope of the present article. Instead we deduce and test predictions that are independent of the specific subjective values and in this sense more general.

Predictions

1. **People who are risk averse for gains are more likely to exhibit deliberate ignorance.** We measure risk aversion for gains in the standard paradigm where people can choose between a certain gain and a risky gamble and where the gamble is not played out if the certain option is chosen. All outcomes have values $v_j \geq 0$, which are commonly referred to as "gains." People are said to be

risk averse if they choose a certain gain $v = \$X$ over a gamble with a higher expected gain $\Sigma(p_j v_j) > \$X$. Prediction 1 is derived as indicated above: People who are risk averse for gains choose the certain gain over a risky gamble, as do people who try to avoid regret in the standard paradigm. The rationale is that the outcome of the certain gamble is known even if the risky gamble is chosen, whereas the outcome of the risky gamble is not known if the certain gain is chosen. Thus, if the regret theory of deliberate ignorance is correct, then people who are risk averse in the standard paradigm should be more likely to exhibit deliberate ignorance. In other words, the same motivation—avoiding anticipatory regret—implies, to some degree, being both risk averse and deliberately ignorant.

2. **People who are risk averse for losses are more likely to exhibit deliberate ignorance.** We measure risk aversion for losses in the standard paradigm where people can choose between a certain loss and a risky gamble and where the gamble is not played out if the certain option is chosen. All outcomes have values $v_j \leq 0$, which are commonly referred to as "losses." People are said to be risk averse for losses if they choose a sure loss $v = -\$X$ over a gamble with a smaller expected loss $\Sigma(p_j v_j)$. The derivation is the same as for Prediction 1: Regret is possible only if the risky gamble is chosen and the loss ends up being greater than the certain loss. Note that Predictions 1 and 2 together imply no difference between gains and losses, unlike in the hypothesis that people are risk averse for gains and risk seeking for losses. Instead, the joint prediction is that risk aversion, whether for gains (Prediction 1) or for losses (Prediction 2), is associated with higher deliberate ignorance.

3. **People who buy (nonmandatory) insurance are more likely to exhibit deliberate ignorance.** Buying insurance is analogous to choosing a sure loss of $\$X$ (the insurance premium) over an expected loss of a smaller magnitude (the difference generates the profit for the insurer). Thus, buying insurance corresponds to risk aversion for losses. Yet this applies only to situations where people have a choice, that is, for nonmandatory insurances such as life insurance as opposed to mandatory insurances such as car and health insurance (depending on the country). Regret can happen if a person decided not to buy an insurance policy and subsequently the noninsured event happened, leading to a loss greater than the premium. Thus, if deliberate ignorance is based on anticipatory regret avoidance and regret can be avoided by buying insurances, people who buy insurance should be more likely to exhibit deliberate ignorance.

4. **Time-to-event hypothesis: If Conditions 1 to 4 hold, people who are closer in time to an event are more likely to not want to know.** By "closer" we mean temporal proximity, that is, that an event is on the verge of happening or has just happened. For instance, the older we get, the closer we near death, and—so the time-to-event hypothesis predicts—the less likely we want to know about the time and cause of our own or our partner's death. Similarly, the hypothesis predicts that men are more likely not to want to know whether they are the biological father just before a child is born compared with years before a child is born. The time-to-event hypothesis can be deduced from the theory by assuming that the function of the values v_j becomes steeper (less flat) the nearer the event approaches. Consider again the question of the time of death of oneself or of one's partner. From the perspective of a 20-year-old, the difference between living to the age of 65 or 75 may not be that important, and the values in Table 2 (top panel) may increase only slightly, such as -10, 0, $+10$. From the perspective of a 50-year-old who is concerned about near death, these values may increase quite steeply, such as -50, 0, $+20$, placing a high negative value on very early death and subsequently increase with diminishing returns. In this numerical example, the younger person should be indifferent between knowing and not knowing, because the largest anticipated regret is the same for Options *K* and *I* (-10). In contrast, the older person should not want to know, because Option *K* has the highest anticipated regret (-50 vs. -20 for Option *I*). In general, assuming that the function v becomes steeper as the event approaches, the probability of not wanting to know should increase equally. The same logic applies to suspense and surprise.

To the best of our knowledge, Predictions 1, 2, and 3 are new. Prediction 1 may appear counterintuitive: If deliberate ignorance is seen as diametrically opposed to a desire for certainty or risk aversion for gains as aligned with a desire for certainty, then people who are risk averse should less likely exhibit deliberate ignorance. The regret model, however, predicts the opposite. The same point can be made for Prediction 2. Both of these predictions apply to standard laboratory tests, whereas Prediction 3 applies to real-world behavior that is subject to many other forces. Prediction 4 was already suggested before by Zeelenberg (1999, pp. 102–103), but without a theoretical framework as proposed here. It appears at odds with the common sense notion that the more relevant a question is, the more a person wants to know the answer. It also appears at odds with theories of curiosity such as Loewenstein's (1994) *information gap hypothesis*, which "views curiosity as occurring when an individual's informational reference point becomes elevated in a certainty domain, drawing attention to an information gap." Loewenstein suggests "preexisting interests" as the driving factors for elevating the reference point (p. 93). Thus, the information gap hypothesis views preexisting interests (corresponding to our Condition 2 above) for search for knowledge, whereas the time-to-event hypothesis instead predicts that the inverse relation holds for deliberate ignorance: The closer an event, as measured by the temporal proximity to the event, the less people want to know.

All four predictions are phrased in terms of "more likely than" because precise numerical predictions would require estimates of the values v_j in the general population as well as control of other factors influencing choice. Nevertheless, if the proposed theory for deliberate ignorance is correct, we should find consistent support for the predictions even if we cannot forecast the effect sizes.

In addition to these predictions, we study two general questions:

1. **Prevalence.** What proportion of the general public engages in deliberate ignorance about a sample of 10 negative and positive events?

2. **Predictability.** If an individual prefers to be deliberately ignorant about an event *X*, does this increase the probability that he or she chooses to be ignorant about other events?

Thus far, the answers to these two questions were unknown because no representative studies existed. To ensure the generalizability of our findings, we obtained representative samples from two large European countries, Germany (Study 1) and Spain (Study 2). Virtually all previous research relied on convenience samples, and much of it was restricted to negative events, such as people's reluctance to undergo tests for Alzheimer's disease, BRCA1 and BRCA2, and HIV status. These studies concluded that a (typically small) proportion of people at high risk do not actively seek information about their genetic or medical conditions, which has been attributed to people's anxiety, denial, or financial considerations (e.g., Melnyk & Shepperd, 2012; Yaniv, Benador, & Sagi, 2004). In the following studies, we investigate both negative events *and* positive events that can elicit surprise and suspense.

Study 1 (Germany)

To study deliberate ignorance in the general public, we made an effort to obtain nationwide representative quota samples for two countries using both face-to-face interviews and experimental tests of risk aversion. The present study is the first to be designed so that inferences from the sample statistics to the population of countries can be made.

Method

Population and sample. To ascertain a representative sample of the general public, we obtained a nationwide quota sample of 1,016 adults in Germany collected by the international survey company GfK Group, based in Nuremberg, Germany. This sample was selected as representative of the German population in terms of four variables: age, gender, region, and size of settlement. Table 3 shows the characteristics of the sample. We report 95% confidence intervals (CIs) for sample statistics, assuming random sampling. When 95% CIs are used, our sample size of approximately 1,000 participants per country provides a power of .99 to detect a small effect size (corresponding to Cohen's $h = .2$) and a power of over .995 to detect a medium effect size (corresponding to Cohen's $h = .5$; Cohen, 1988). CIs are more informative than significance levels (Cumming, 2008).

Procedure and selection of events. Quality of data was a major objective for us, and thus we used face-to-face interviews and experiments rather than a less expensive telephone survey. With the face-to-face method, the interviewer was able to establish rapport with participants, respond to queries, and explain the meaning of the questions when needed. After a first telephone contact was established, all participants were interviewed individually in their homes. The interviewers were unaware of the purpose and the hypotheses of the study.

Table 3
The German and the Spanish Sample by Gender, Age, Religious Practice, Education, Marital Status, Risk Aversion, and Insurances Bought

Category	Germany		Spain	
	n	%	*n*	%
Total	1,016	100.0	1,002	100.0
Gender				
Male	494	48.6	491	49.0
Female	522	51.4	511	51.0
Age				
18–35	265	26.1	322	32.1
36–50	291	28.6	304	30.3
51+	460	45.3	376	37.5
Religious service per month				
0 times	700	69.0	699	69.8
1–3 times	175	17.2	175	17.5
4+ times	140	13.8	127	12.7
Education				
1	49	4.9	53	5.3
2	391	39.2	139	14.0
3	330	33.1	328	32.9
4	138	13.8	321	32.2
5	90	9.0	155	15.6
Marital status				
Married	411	40.5	409	40.8
Not married	605	59.5	593	59.2
Risk aversion				
1	226	32.3	271	35.9
2	287	41.0	132	17.5
3	156	22.3	287	38.0
4	31	4.4	65	8.6
Insurance				
Life	585	57.6	423	42.2
Household	780	76.8	712	71.1
Personal	771	75.9	227	22.7
Legal	447	44.0	51	5.1

Note. Education: 1 = primary/lower secondary school without vocational training; 2 = primary/lower secondary school with vocational training; 3 = further education without secondary school leaving qualification (U.S.: high school diploma); 4 = secondary school leaving qualification; 5 = university. Percentages do not sum to 100% because 18 Germans and 6 Spaniards were still in school. Risk aversion: 1 = risk averse for gains and risk seeking for losses; 2 = risk averse for gains and losses; 3 = risk seeking for gains and losses; 4 = risk seeking for gains and risk averse for losses (numbers do not add up to total sample size because risk neutrals are not shown, but see Table 7). Insurance: Life = life insurance; Household = household insurance (*Hausratsversicherung*); Personal = personal liability insurance (*Privathaftpflicht*); Legal = legal expenses insurance. Percentages do not sum to 100% because many people bought more than one optional insurance.

Although we could obtain representative samples of participants, we had to use a selected sample of events in the absence of a known population of events to sample from. The selection procedure we used is as follows: We excluded events where knowing the true outcome appears to have only positive consequences (such as wanting to know ahead the winning lottery numbers) which would violate Condition 4 above, but focused on events which seemed likely to produce deliberate ignorance. We excluded questions concerning HIV, Huntington's disease, and similar questions of medical testing that have been investigated before because we were interested in whether deliberate ignorance extends beyond dealing with severe diseases and infections. In-

stead, we selected three kinds of major losses: the death of one's partner, one's own death, and divorce. Participants were asked five questions about these negative events: Would you want to know today (a) When your partner will die? (b) From what cause your partner will die? (c) When you will die? (d) From what cause you will die? and (e) Whether your marriage will eventually end in divorce or not? Thus, the set of "negative" events consisted of two questions concerning the partner, two concerning the participant, and one concerning their marriage. For each of these questions, a rational argument can be made that a forward-looking individual would be better off by knowing the answers (see below).

With respect to positive events, we chose five questions that complement the negative events and capture surprise and suspense. As a counterpoint to death, the question of afterlife was chosen, Would you like to know whether there is life after death? The other questions concerned mundane surprise and suspense, Would you want to know the sex of your child before birth? Would you want to know in advance what you are getting for Christmas? In addition, we described a situation where a person watches a recording of a soccer game, and a friend enters who knows how it ended. The question was, Would you want to know from the friend how it ended (as opposed to asking not to tell)? Finally, we used a situation that could also tap onto avoiding cognitive dissonance, where a person has bought a blue sapphire in a far-away country for a large sum; back home, the question is, Would you have the sapphire tested to be sure whether it is genuine or not? Although these 10 questions span a broad range of events, the results should be interpreted as an existence proof for these events only.

To test the predictions, we performed a test of risk aversion for gains and losses with every participant, and collected data about participants' insurances. In total, participants were asked 24 questions, 10 questions concerning the 10 events (see below for the wording), two questions concerning risk aversion (one for gains and one for losses, see below for the wording), two questions on deliberate ignorance about paternity, four questions on background data (such as buying insurance, the number of religious services attended in the last month, see below and Table 3), and six questions unrelated to the topic of deliberate ignorance which are not reported here.[1] We report here all events asked on deliberate ignorance in the survey, with the exception of questions on paternity, which led to similar results but will be reported in a separate publication. The Ethics Committee of the Max Planck Institute for Human Development approved the methodology.

Results

Prevalence in the general public. We first report the results for the five negative events, and then for the five positive ones.

Negative events. For each of the events, we first list the exact wording of the questions (translated into English), the percentage of people who do not want to know the answer, and, in parentheses, further information.

Would you want to know today when your partner will die?

No: 89.5%. (Uncertain: 6.5%; Yes: 4.0%; $N = 992$)

Would you want to know today from what cause your partner will die?

No: 90.4%. (Uncertain: 5.0%; Yes: 4.5%; $N = 989$)

Would you want to know today when you will die?

No: 87.7%. (Uncertain: 8.2%; Yes: 4.2%; $N = 1{,}002$)

Would you want to know today from what cause you will die?

No: 87.3%. (Uncertain: 6.4%; Yes: 6.3%; $N = 1{,}001$)

Assume you are newly married. Would you want to know today whether your marriage will eventually end in divorce or not?

No: 86.5%. (Yes: 13.5%; $N = 991$)

Thus, between 86% and 90% of the general population would not want to know the answer to these eventualities. The 95% CIs for the "no" answers are 1.8 percentage points, assuming random sampling. This large proportion of individuals who would not want to know exceeds those reported before in studies on refusal to test for diseases and infections, which are typically between 10% and 30% (see above). In terms of the regret theory, the interpretation is that a majority of people anticipate that they would regret an unpleasant answer—that their partner will die very early, that they will die early, or that their marriage will end in divorce. This anticipated regret is larger than the regret associated with foregoing possibly good news. As a consequence, they prefer deliberate ignorance.

Positive events. Again, we list the exact wording, the percentage of people who do not want to know the answer, and, in parentheses, further information.

Assume you video-recorded a soccer world-champion game because you could not watch it live. While you are watching the recording, a friend enters who has already watched the game. Would you want to know from the friend how it ended (as opposed to asking not to tell)?

No: 76.9%. (Yes: 23.1%; $N = 981$)

Would you want to know in advance what you are getting for Christmas?

No: 59.6%. (Uncertain: 33.5%; Yes: 6.8%; $N = 1{,}005$)

Would you like to know whether there is life after death?

No: 56.9%. (Yes: 43.1%; $N = 988$)

Assume you bought a blue sapphire for 2,000 euros during your vacation in Sri Lanka. The dealer assured you that the sapphire is genuine. Back home, you can check this, but you have no chance of lodging a complaint or returning the stone. A test would cost 50 euros. Would you have the sapphire tested to be sure whether it is genuine or not?

[1] Four of the six unrelated questions were on probabilistic thinking, and tested the reproducibility of earlier findings in the present representative samples: (a) what does a "25% reduction in breast cancer" by mammography mean (Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz, & Woloshin, 2007, p. 64), (b) what does a "30% chance of rain tomorrow" mean (Gigerenzer, Hertwig, van den Broek, Fasolo, & Katsikopoulos, 2005), (c) which diagnostic tests are absolutely certain (Gigerenzer et al., 2007, p. 62, Figure 6), and (d) the relative risk of driving versus flying (Gigerenzer, 2014, p. 13). The remaining two questions were on (e) rules of thumb in everyday decisions on TV programs, shopping, and dining (Gigerenzer, 2014, p. 140) and on (f) male versus female intuition (Gigerenzer, Galesic, & Garcia-Retamero, 2014). The unrelated questions were randomly interspersed between the questions concerning deliberate ignorance.

No: 48.6%. (Yes: 51.4%; $N = 979$)

Assume you/your partner is pregnant. The gender of the child can be reliably determined by ultrasound. Would you want to know the gender of your child before birth?

No: 40.3%. (Partner should decide: 16.3%; Yes: 43.4%; $N = 983$)

The percentage of participants who would not want to know the answer to these questions is lower than for the negative events, but still high. Between 40% and 77% would not want to know. For instance, 40.3% would not want to know the gender of their child before birth, despite available technology, and another 16.3% would delegate the decision to their partner. In terms of the regret theory, the interpretation is that these people anticipate regret in knowing the answer because this would spoil surprise and suspense. The 95% CIs are about 3.1 percentage points for percentages around 50%, assuming random sampling. In sum, deliberate ignorance for positive events is high (on average, 56.4%), albeit lower than for negative events (88.3%). We found that people who consistently wanted to know were extremely rare, only 1.1% of the participants, whereas 98.9% did not want to know the answers to one or more of the questions.

Discussion: Prevalence

Study 1 shows, for the first time, that widespread deliberate ignorance exists in the general public, particularly for negative events but also for positive ones. This high prevalence is difficult to reconcile with theories that postulate that people have a general need for certainty, a need to avoid ambiguity, or a need for closure (see Hogarth, 1987; Kruglanski, 2004). To prefer deliberate ignorance means that one does not strive for certainty, chooses to live with ambiguity, and has little need for closure.

The present results also stand in contrast to standard interpretations of rational choice theories. For each of the five negative events, a good case can be made that forward-looking agents would be better off if they knew. Consider wanting to know when one's partner will die. In his Nobel lecture, Becker (1993) described forward-looking agents as individuals who "maximize welfare *as they conceive it*, whether they be selfish, altruistic, loyal, spiteful, or masochistic" (p. 386). Whatever one's goal is, selfish or otherwise, knowing when one's partner will die could provide essential information to maximize welfare. This includes planning how much to save for old age, how much time to spend with one's partner, and when to move the partner to a hospice rather than continuing with toxic chemotherapy that would reduce the quality of life without any benefit. Knowing the answer would also help to avoid running out of money because one had not expected to live so long or enable the family to plan spending the last weeks or days with the beloved one, without arriving too late. More specifically, knowing the time of death would allow for more valid parameter estimates in Becker's (1993) rational analysis, such as the utility of parental altruism in old age and its discount rate beta. Similar arguments can be made in favor of knowing the cause of one's partner's death, the time and cause of one's own death, and whether one's marriage will end in divorce. Anticipating divorce, for instance, could reduce emotional and legal expenses such as over custody for children and bequests and also be useful in preparing for a potential decline in resources. Consequently, in Becker's and similar rational choice theories, it would be rational to want to know, particularly if the information were for free. In contrast, Study 1 showed that this behavior is the exception rather than the rule in situations where choice is influenced by anticipatory regret.

Similarly, it can be argued that forward-looking agents would be better off knowing at least some of the outcomes of positive events. Consider the question of wanting to know the gender of one's child before birth. According to Becker's (1960/1995) theory of the family, parents receive "marginal utility equal to U_m from a male child and U_f from a female child" (pp. 246–247). If $U_m \neq U_f$ and if parents do not know the gender, this creates what Becker calls "uncertainty," which makes it necessary to distinguish between the actual utilities U_m and U_f, and the expected utility $EU = (U_m + U_f)/2$. Thus, for the planning of the further household consumption and production of a family, as Becker sees it, there is a strong incentive to know the gender as soon as possible in order to reduce the uncertainty about the actual marginal utility of a child. Becker's agents are forward-looking but have no "utility" for surprise and suspense, nor are their choices influenced by anticipated regret.

The psychological concepts of a need for certainty and Becker's rational choice theory stand as examples for theoretical views that would lead to the rational expectation that people would want to know. In contrast to this expectation, for the positive and negative events studied, the majority of people behaved consistently with the regret theory of deliberate ignorance, according to which people do not want to know if the option of knowing is associated with the maximum regret.

Predictability

Is it possible to predict whether individuals prefer deliberate ignorance about one event on the basis of knowing their preferences regarding another event? To answer this question, we performed a correlation analysis from which three results emerged.

First, responses to questions about negative events were highly correlated (see Table 4), with the highest correlations between the time and the cause of one's partner's death (.82) and the time and the cause of one's own death (.83). Thus, if individuals would not want to know the time of the partner's death, one can predict that they likely would not want to know the cause either, and vice versa. In contrast, the correlation between wanting to know one's own time of death and that of the partner was lower, albeit still high (.67). Thus, the predictability of deliberate ignorance is higher when holding the person constant (oneself or partner) and varying the attribute (time or cause) rather than vice versa. All in all, questions about death show high correlations, suggesting that people treat them as a whole. In terms of the regret theory, people who anticipate regret if they knew that the answer to such a question is unpleasant—such as that one's partner will die early—also anticipate a similar amount of regret to other similar questions. This homogeneous anticipated regret also transfers to divorce, albeit of substantially lower magnitude.

Second, correlations between desirable events were strikingly different; their magnitude was consistently low, with an average of

Table 4
Predictability of Deliberate Ignorance

Event	1	2	3	4	5	6	7	8	9	10
1. Time of partner's death	—									
2. Cause of partner's death	.82 (.001)	—								
	.78 (.001)									
3. Time of own death	.67 (.001)	.61 (.001)	—							
	.62 (.001)	*.52 (.001)*								
4. Cause of own death	.62 (.001)	.75 (.001)	.83 (.001)	—						
	.55 (.001)	*.69 (.001)*	*.71 (.001)*							
5. Divorce	.32 (.001)	.25 (.001)	.28 (.001)	.32 (.001)	—					
	.29 (.001)	*.29 (.001)*	*.22 (.001)*	*.28 (.001)*						
6. Soccer result	.14 (.001)	.20 (.001)	.14 (.001)	.20 (.001)	.16 (.001)	—				
	.07 (.038)	*.03 (.315)*	*.07 (.023)*	*.04 (.255)*	*.08 (.015)*					
7. Christmas present	.38 (.001)	.34 (.001)	.22 (.001)	.31 (.001)	.26 (.001)	.27 (.001)	—			
	.08 (.018)	*.09 (.001)*	*.19 (.001)*	.19 (.001)	*.16 (.001)*	*.13 (.001)*				
8. Afterlife	.08 (.017)	.07 (.040)	.16 (.001)	.15 (.001)	.27 (.001)	.05 (.147)	.11 (.004)	—		
	.12 (.001)	*.16 (.001)*	*.12 (.001)*	*.19 (.001)*	*.23 (.001)*	*−.01 (.84)*	*.11 (.002)*			
9. Sapphire	.06 (.052)	.06 (.085)	.08 (.021)	.05 (.123)	.10 (.002)	.03 (.368)	.12 (.003)	.08 (.009)	—	
	.06 (.075)	*.04 (.230)*	.05 (.143)	*.04 (.175)*	*.13 (.001)*	*.01 (.714)*	*.05 (.127)*	*.09 (.003)*		
10. Sex of child	.10 (.001)	.11 (.003)	.13 (.001)	.12 (.001)	.16 (.001)	.20 (.001)	.20 (.001)	.22 (.001)	.11 (.002)	—
	.07 (.022)	*.07 (.025)*	*.05 (.100)*	*.05 (.114)*	*.09 (.006)*	*.06 (.056)*	*.18 (.001)*	*.07 (.022)*	*.08 (.019)*	

Note. Correlations are high among negative events (events 1–5, top left), strikingly low among positive events (events 6–10, bottom right), and also low between negative and positive events (center). Coefficients are phi correlations with exact *p*-values from chi-square tests in parentheses. Top values are for the German sample (n = 1,016), bottom values (in italics) for the Spanish sample (n = 1,002).

.14, and sometimes even undistinguishable from zero (see Table 4). For instance, not wanting to know whether there is life after death does not predict whether the same person would want to know the result of a soccer game that has already been played. The only pattern of (small) correlations exists between the three questions that likely best exemplify mundane suspense and surprise, that is, soccer, Christmas presents, and sex of child. In terms of the regret theory, this result implies that the anticipated surprise and suspense for one positive event is only weakly linked to other events. Such a result would be implied by varying, domain-specific levels of v_j for surprise and suspense within the same individual.

Finally, correlations between positive and negative events were equally low, with an average of .16. A remarkable finding across all events is the absence of negative correlations. This means that there is no evidence for compensation: Not wanting to know about one eventuality never appears to lead to wanting to know about another one, or vice versa. A desire to know is not compensated by a desire not to know. Compensation would be consistent with a regret model where the values v_j for different events are constrained by an upper limit, as in a system where regret is a scarce resource.

A Guttman scale analysis confirms the correlation analysis. If the responses have the structure of a Guttman scale, then a set of N questions can be ordered ($i = 1, \ldots, N$) such that an individual who agrees with question i also agrees with all lower-rank questions $k < i$. As a consequence, only $N + 1$ possible individual types exist. In the context of deliberate ignorance, a Guttman scale would require both question and individuals to be ordered so that someone who does not want to know the answer to question i also does not want to know the answers to lower-rank questions $k < i$. To test whether this form of one-dimensionality holds, we combined the "uncertain" with the "yes" responses in order to binarize the response variable, as required by the Guttman model. The fit of the data with a Guttman scale can be measured by the coefficient of reproducibility C_R:

$$C_R = 1 - \text{number of errors/number of possible errors}, \quad (4)$$

where an error is a response of an individual that deviates from the ideal Guttman scale for all individuals considered. According to Guttman (1944), at least a $C_R = .9$ is needed for the response structure to form a Guttman scale. An analysis of the negative events shows that $C_R = 1 - 262/5080 = .95$, thus providing support for a Guttman scale, whereas that is not the case for the positive events ($C_R = 1 - 1679/5080 = .67$). This result confirms the correlational analysis. Because the values for the Spanish sample replicate those in Germany almost precisely (undesirable events: $C_R = .94$; desirable events: $C_R = .65$), we show in Table 5 the Guttman scale for the total sample.

There are six types of individuals. Type *I* would not want to know (symbolized by "0") the answer to any of the negative events. Nor would Type II, apart from wanting to know whether one's marriage will end in divorce. Type III would additionally want to know the cause of own death, but nothing else, and so on. Finally, Type VI would want to know the answers to all eventualities. Note that a Guttman scale allows only $N + 1$ (here: 6) response patterns and forbids the other 26 of the total of 2^N (here: 32) possible patterns. For instance, a violation would occur if an individual who would want to know the time of the partner's death would not want to know whether their marriage will end in divorce.

Discussion: Predictability

The analyses show that predictability (homogeneity) is strong for negative events but low or absent for positive events. If deliberate ignorance is motivated by regret avoidance, as postulated by the regret theory, then the strength of this motive is

Table 5
Negative Events (But not the Positive Events) Form a Guttman Scale

Individual type	Negative event				
	Time of partner's death?	Cause of partner's death?	Time of own death?	Cause of own death?	Divorce?
I	0	0	0	0	0
II	0	0	0	0	1
III	0	0	0	1	1
IV	0	0	1	1	1
V	0	1	1	1	1
VI	1	1	1	1	1

Note. A Guttman scale enables questions and individuals to be ordered so that there is never a "1" (wanting to know) before a "0" (not wanting to know). The order of events is from left to right. For instance, individuals of Type *I* (complete deliberate ignorance) would not want to know the answer to any of the questions. Individuals of Type II would want to know whether their marriage will be divorced, but nothing else, and so on.

more consistent (and predictable) across potentially bad news than good news. What limits this generalization is that the evidence from Study 1 is dependent on the specific 10 questions selected. However, such an asymmetry, creating a "negative halo" effect, has been reported in other contexts (Gigerenzer, 1981). As we will see, essentially the same results were replicated in the Spanish sample.

Study 2 (Spain)

A test of the generalizability of the results in a different large European country not only is of interest in itself but also facilitates methodological checks. First, it allows for ascertaining which parts of the results are stable across countries and which are culture-specific. Second, an independent replication with a second sample is a safeguard against false positives, which can emerge from the large dimensionality of the data with 10 events and numerous demographic measures.

Method

We conducted a second study in Spain with 1,002 adults. The sample was obtained by the same representative quota method, using face-to-face interviews and experiments, and the design was identical to the study in Germany. Equally important for comparability, the survey was conducted by the same company, the GfK Group, which has an office in Valencia, Spain. All materials were translated into Spanish by a proficient translator and back-translated for control into German by another person with equivalent language skills. The Ethics Committee of the University of Granada approved the methodology.

Results

Prevalence and predictability of deliberate ignorance replicated well in the Spanish sample (Figure 3 and Table 4). Across all events, the prevalence was 1.5 percentage points lower than in Germany (95% CI = 1.32 to 1.68). Yet Figure 3 reveals that this moderate difference results from relatively large specific but opposite effects, such as that fewer Spaniards would want to be surprised about the sex of their child (34.7% vs. 40.3% Germans) but more would want to be surprised about their Christmas presents (69.2% compared to 59.6% of Germans). Thus, one cannot conclude that Germans more likely would not want to know across all events. In terms of regret theory, the value for surprise and suspense regarding the sex of one's child appears to be higher for Germans than for Spaniards, whereas the opposite holds for Christmas presents. As in the German sample, people who consistently wanted to know were extremely rare, only 0.6% of all participants.

Because the findings in both representative samples replicate well, the results of both studies are presented together. We now turn to the test of Predictions 1 and 2.

Deliberate Ignorance and Risk Aversion (Studies 1 and 2)

We measured risk aversion in a standard paradigm by providing a person with a choice between a certain gain (loss) and a gamble. As explained above, no feedback is given about the actual outcome of the risky gamble if the certain gamble is chosen. To measure

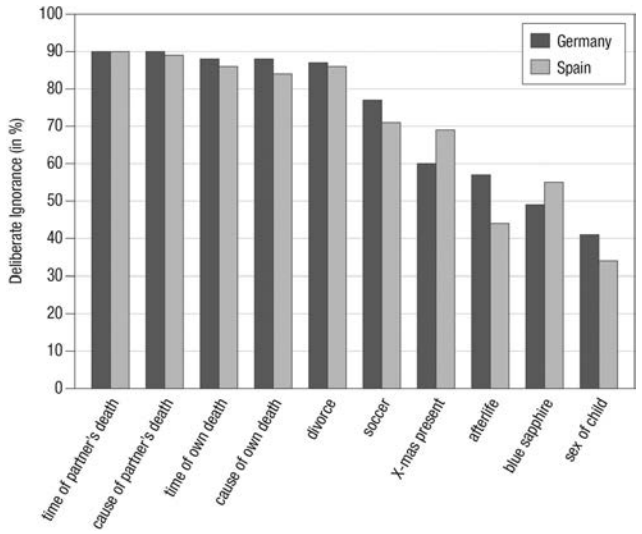

Figure 3. Prevalence of deliberate ignorance concerning positive and negative events (see text) in two national quota samples in Germany (n = 1,016) and Spain (n = 1,002). For instance, 89.5% of Germans and 90.5% of Spaniards would not want to know when their partner is going to die.

risk aversion in gains and losses, we gave each participant two tasks:

Risk Aversion in Gains

You won a contest and have to choose between two alternatives: a lottery and a sure gain. The lottery has 10 items, five of which win 100 euros, the others nothing. Would you prefer the sure gain to the lottery?

Win 20 euros for sure instead of the lottery. yes/no

Win 30 euros for sure instead of the lottery. yes/no

Win 40 euros for sure instead of the lottery. yes/no

Win 50 euros for sure instead of the lottery. yes/no

Win 60 euros for sure instead of the lottery. yes/no

Win 70 euros for sure instead of the lottery. yes/no

The options (which the interviewer presented to the participant) appeared successively on a screen until the participant answered "yes." A participant is said to be risk averse for gains if preferring a sure gain to a lottery, even if the sure gain is smaller than the lottery's expected value. An example is if the participant prefers 40 euros for sure to a lottery whose expected value is 50 euros. A participant is said to be risk seeking if preferring a lottery to a sure win despite the lottery having a smaller expected gain. An example would be to prefer the lottery to a sure win of 60 euros.

Risk Aversion in Losses

You lost a contest and have to choose between two alternatives: a lottery and a sure loss. The lottery has 10 items, for five of which you have to pay 100 euros, for the others nothing. Would you prefer the sure loss to the lottery?

Pay 70 euros for sure instead of the lottery. yes/no

Pay 60 euros for sure instead of the lottery. yes/no

Pay 50 euros for sure instead of the lottery. yes/no

Pay 40 euros for sure instead of the lottery. yes/no

Pay 30 euros for sure instead of the lottery. yes/no

Pay 20 euros for sure instead of the lottery. yes/no

Again, the options appeared successively on the screen until the participant answered "yes." A participant is said to be risk averse for losses if preferring a sure loss to a lottery with a smaller expected loss, and risk seeking for losses if preferring a lottery to a sure loss despite the lottery having a higher expected loss. Table 3 shows the proportion of Germans and Spaniards who were risk averse/seeking for gains and/or losses. Note that Table 3 excludes people who were risk neutral, that is, neither risk averse nor seeking; these participants are included in Table 6.

Across both samples, 54.7% of participants were risk averse and 29.6% risk seeking for gains (see Table 6). For losses, 57.5% were risk seeking and 28.2% were risk averse. An interesting result outside of the focus of this study is that in these two representative samples of the general population in Germany and Spain, the hypothesis that people are risk averse for gains and risk seeking for losses (e.g., Kahneman & Tversky, 1979) held for 25.2% of all participants, whereas 4.9% showed the opposite pattern. In contrast, more participants (43.7%) were consistently risk averse or consistently risk seeking for both gains and losses.

Table 6
Risk-Averse, Risk-Seeking, and Risk-Neutral Responses Across Two Representative Samples of 1,016 Germans and 1,002 Spaniards (Total N = 2,018)

	Losses			
Gains	Risk averse	Risk neutral	Risk seeking	Total
Risk averse	21.2	8.2	25.2	54.7
Risk neutral	2.1	3.8	9.8	15.8
Risk seeking	4.9	2.2	22.5	29.6
Total	28.2	14.2	57.5	100.0

Note. The numbers are percentages. This table includes risk neutrals, whereas Table 3 compares risk-averse and risk-seeking responses. When risk neutrals are included, one can see that only 25.2% participants showed risk aversion for gains and risk seeking for losses, and 43.7% were consistently risk averse or risk seeking (21.2% + 22.5% = 43.7%).

Prediction 1: People who are risk averse for gains are more likely to exhibit deliberate ignorance. As mentioned above, Prediction 1 may appear counterintuitive if risk aversion is associated with a desire for certainty or wanting to know, although the hypothesis that people avoid regret implies the opposite prediction. This prediction can be tested for each of the 10 events. Table 7 shows that for each of the 10 tests, the percentage of participants who would not want to know is higher among those who are classified as risk averse than risk seeking for gains, as predicted by the regret theory. The average difference is 4.0 percentage points (95% CI = 3.80 to 4.20). For instance, participants who are risk averse for gains more often would not want to know in advance the sex of an unborn child. The largest absolute effect size is for life after death, where risk-averse participants more often chose not wanting to know, with a difference of 7.2 percentage points. Thus, this consistent difference across all 10 events supports Prediction 1 and the hypothesis that deliberate ignorance is associated with the same anticipatory regret as measured in monetary gambles.

Prediction 2: People who are risk averse for losses are more likely to exhibit deliberate ignorance. Prediction 2 may appear counterintuitive for the same reason as Prediction 1, but also because it implies that not the difference between gains and losses but the difference between risk aversion and risk seeking is relevant for understanding deliberate ignorance. This prediction can also be tested on the 10 events. As Table 7 shows, for all but one event (soccer), the proportion of participants who would not want to know is higher among those who are classified as risk averse, as predicted by the regret theory. The average difference is 3.2 percentage points (95% CI = 3.16 to 3.24), thus of similar size to that for risk aversion for gains. The largest difference was once again obtained for life after death, followed by Christmas presents, with 8.8 and 5.4 percentage points, respectively.

Table 7
Percentage of Participants Who Would Not Want to Know Information About Different Events, by Country, Sex, Age, Education, Marital Status, Attendance of Religious Services, Risk Aversion, and Purchase of Non-Obligatory Insurances

	Event										
	Death										
	Partner		Own								
Category	Time	Cause	Time	Cause	Divorce	Soccer	Christmas	Afterlife	Sapphire	Sex of child	Total
Total	90.2	89.4	86.7	85.8	86.2	73.6	64.4	50.4	51.9	37.4	71.6
Country											
Germany	89.5	90.4	87.7	87.3	86.5	76.9	59.6	56.9	48.6	40.3	72.3
Spain	90.5	88.9	85.4	84.0	85.8	70.4	69.2	44.6	54.3	34.7	70.8
Gender											
Male	89.4	88.6	85.2	84.1	85.6	75.8	62.8	52.6	49.5	38.8	71.2
Female	90.9	90.3	88.2	87.4	86.7	71.4	66.0	48.3	54.2	36.1	72.0
Age											
18 to 35	87.3	86.6	86.3	84.0	83.1	72.3	56.8	46.1	48.8	28.0	67.9
36 to 50	90.7	89.7	86.6	85.5	85.5	71.7	65.9	52.3	49.3	34.2	71.1
51+	92.3	91.9	87.8	88.0	89.2	76.3	70.7	53.9	56.0	48.8	75.5
Education[a]											
1	96.0	96.0	89.1	91.1	89.1	72.4	70.4	51.5	56.6	53.5	76.6
2	89.9	89.6	86.6	86.8	89.4	79.5	68.0	55.6	48.4	41.9	73.6
3	91.1	90.5	88.0	86.3	86.1	74.4	59.7	52.4	51.5	37.2	71.7
4	89.1	86.8	84.9	83.6	82.7	68.8	66.4	45.4	53.4	34.6	69.6
5	88.9	89.3	86.5	84.8	85.2	68.2	64.2	44.0	57.4	28.3	69.7
Marital status											
Yes	89.0	88.2	84.2	83.5	84.0	72.0	59.9	47.4	52.9	36.8	69.8
No	91.0	90.3	88.5	87.4	87.6	74.7	67.5	52.5	51.3	37.9	72.9
Religious											
No	91.6	90.8	87.8	86.5	87.1	76.5	64.9	54.2	51.7	34.2	72.5
1 to 3	86.5	86.3	84.0	85.4	83.6	65.3	62.2	43.5	51.1	42.7	69.1
4+	87.8	85.9	85.0	80.7	84.8	70.7	66.3	36.1	56.5	51.2	70.5
Risk aversion											
Gains											
Risk averse	91.4	90.2	88.5	87.2	88.0	73.4	68.0	52.8	53.8	40.2	73.4
Risk seeking	88.1	89.6	84.2	85.4	83.5	72.8	62.1	45.6	48.4	34.1	69.4
Losses											
Risk averse	91.9	90.1	89.0	87.2	87.9	72.5	69.4	56.6	53.2	40.5	73.9
Risk seeking	89.1	88.7	85.9	84.9	85.9	74.2	64.0	47.8	50.7	36.0	70.7
Insurance											
Life											
Yes	90.6	90.4	88.6	86.6	87.6	73.3	63.9	54.1	52.0	38.1	72.5
No	89.7	88.4	84.9	85.0	84.7	73.8	64.9	46.7	51.9	36.8	70.7
Household											
Yes	91.0	90.6	87.6	87.3	87.1	74.1	66.0	52.4	51.7	38.7	72.7
No	87.7	86.1	84.1	81.4	83.5	72.1	59.9	44.7	52.7	33.8	68.6
Personal											
Yes	91.0	90.8	88.0	87.4	86.7	74.8	63.5	54.0	50.7	38.4	72.5
No	89.4	88.1	85.4	84.3	85.6	72.4	65.3	46.9	53.2	36.5	70.7
Legal											
Yes	91.6	92.0	89.9	90.1	87.2	78.2	63.4	53.7	46.6	43.1	73.6
No	89.7	88.6	85.7	84.4	85.8	72.1	64.7	49.3	53.7	35.5	71.0

Note. Education: 1 = primary/lower secondary school without vocational training; 2 = primary/lower secondary school with vocational training; 3 = further education without secondary school leaving qualification (U.S.: high school diploma); 4 = secondary school leaving qualification; 5 = university. Percentages do not sum to 100% because 18 Germans and 6 Spaniards were still in school. Risk aversion: 1 = risk averse for gains and risk seeking for losses; 2 = risk averse for gains and losses; 3 = risk seeking for gains and losses; 4 = risk seeking for gains and risk averse for losses. Insurance: Life = life insurance; Property = personal property insurance (*Hausratsversicherung*"); Personal = personal liability insurance (*Privathaftpflicht*); Legal = legal expenses insurance. Percentages do not sum to 100% because many people had bought more than one optional insurance.

To summarize, people who are risk averse are more likely to exhibit deliberate ignorance, and the distinction between gains and losses does not matter. This is consistent with the theoretical explanation that the anticipatory regret that motivates risk aversion also motivates deliberate ignorance.

Deliberate Ignorance and Buying Insurance

As mentioned before, Prediction 3 can be tested only with insurances that are not obligatory, that is, where individuals have a choice. This excludes car and health insurances in Germany and

Spain. We asked participants whether they had bought the following nonobligatory insurances (numbers in brackets are the percentage of participants who had done so):

1. life insurance [Germany: 58%; Spain: 42%]
2. household insurance [Germany: 77%; Spain: 71%]
3. personal liability insurance [Germany: 76%; Spain: 23%]
4. legal expenses insurance [Germany: 44%; Spain: 5%]

Household insurance is popular in both countries and covers damage to, or loss of, personal possessions located within an individual's home (anything that is not permanently attached to the structure of the home). Personal liability insurance covers the typical risks of everyday life, such as when a pedestrian or cyclist causes an accident. Finally, legal expense insurance covers the costs of legal action brought against the policyholder. For each of the four nonobligatory insurances, more Germans than Spaniards had bought it.

Prediction 3: People who buy (nonobligatory) insurance are more likely to exhibit deliberate ignorance. The data allowed for 40 tests of Prediction 3 (4 insurance policies times 10 events). People who bought life insurance were more likely to prefer deliberate ignorance for all but two events (soccer and Christmas presents; see Table 7). The average difference across the 10 events was 1.8 percentage points (95% CI = 1.62 to 1.98). For instance, individuals who had purchased life insurance were more likely not to want to know whether there is life after death, with a difference of 7.4 percentage points. Similarly, people who had bought household insurance were more likely to exhibit deliberate ignorance for all but one event (sapphire), with an average difference of 4.1 percentage points (95% CI = 3.92 to 4.28). People who had bought personal liability insurance were more likely to prefer deliberate ignorance for all but two events, with an average difference of 1.8 percentage points (95% CI = 1.62 to 1.98). Finally, the same result was obtained for people who had bought legal expenses insurance, with an average difference of 2.6 percentage points (95% CI = 2.42 to 2.78).

All in all, in 33 out of the 40 tests, people who had bought nonobligatory insurance were more likely to exhibit deliberate ignorance. Thus, these results are consistent with Prediction 3, derived from the hypothesis that, like deliberate ignorance, buying insurance is motivated by anticipatory regret aversion.

Time-to-Event Hypothesis

A common assumption is that the more distant an event is, the less people are interested, and the closer the event approaches, the more likely people will want to know about it. A similar argument underlies temporal discounting models, where the utility of future events is discounted relative to the present utility. The resulting "temporal myopia" has been used to explain why young people do not consider the long-term consequences of unhealthy behavior and unsafe sex or the fact that they are mortal (Stevens, 2016). Applied to our topic, the *temporal myopia hypothesis* suggests that people less likely want to know about significant personal events the remoter these are in the future. Yet if anticipatory regret is involved, the present regret theory makes the opposite prediction, as derived above.

Prediction 4: If regret avoidance is at issue, people who are closer in time to an event are more likely to not want to know about the true outcome. Six of the 10 events allow for a test of Prediction 4, four of these relating to death, one to divorce, and one to life after death. The other events lack a temporal trajectory on which an event draws closer as people age.

Death. If Prediction 4 is correct, the older people are, the less they should want to know about the time and cause of their own death and that of their partner. In contrast, the temporal myopia hypothesis predicts that younger people would be less motivated to know. Consider first the time of one's partner's death (see Table 7). Among younger participants age 18 to 35, 87.3% would prefer not to know, which increases to 90.7% among 36 to 50 year-olds, and again to 92.3% among those over 50 (a total of 5.0 percentage points, 95% CI = 1.72 to 8.28). Thus, as predicted, the older people are, the less likely they would want to know when their partner dies. A logistic regression analysis shows that this effect of age does not disappear when the other variables in Table 3 are taken into account. This effect supports the time-to-event hypotheses, but is inconsistent with the temporal myopia hypothesis. Consider next the time and cause of one's own death and the cause of one's partner's death. For each of these events, the likelihood of deliberate ignorance increases with age and in strict order. The average difference between the youngest and oldest age group across all four events is 3.95 percentage points (95% CI = .45 to 7.45). Logistic regressions show that the effect of age remains after the influence of the other variables in Table 3 are taken into account, except for the time of own death. Thus, there is no evidence for the temporal myopia hypothesis that younger people do not want to know about death. In contrast, the evidence consistently favors the time-to-event hypothesis: The older people are, the less likely they want to know about time and cause of death.

Divorce. The temporal myopia hypothesis suggests that the younger people are, the less likely they want to know whether their marriage will end in divorce. The time-to-event hypothesis predicts the opposite pattern: With increasing age, people are less likely to want to know. The reason is that regret increases the more likely the event of divorce becomes. In both Germany and Spain, divorce is least likely for the youngest group age 18 to 35, and the cumulative probability of getting divorced at least once increases with age. Table 7 shows that the percentage of people who do not want to know increases from 83.1 to 85.5 to 89.2 for the youngest, middle, and oldest group of participants, respectively, consistent with the time-to-event hypothesis. The difference between the youngest and the oldest group is 6.1 percentage points (95% CI = 2.36 to 9.84). A logistic regression analysis shows that the effect of age does not disappear when all other variables in Table 3 are taken into account.

A second, more indirect way to test the time-to-event hypothesis is to use the precondition of actually being married as a proxy for the time to a possible divorce. For this variable, the hypothesis predicts that married persons less likely want to know whether their marriage will end in divorce, whereas the myopia hypothesis predicts the opposite. As Table 7 shows, 84.0% and 87.6% of married and unmarried individuals would like to know (3.6 percentage points, 95% CI = 2.16 to 6.98), consistent with the time-to-event hypothesis. A logistic regres-

sion analysis reveals, however, that this effect disappears when the contribution of all other variables in Table 7 are taken into account.

Life after death. The temporal myopia hypothesis implies that younger people less likely want to know whether there is life after death, and the time-to-event hypothesis predicts the opposite, namely that the older people are, the closer the time of death and the greater the anticipated regret, so that they are less likely to want to know. Table 7 shows that among the 18 to 35-year olds, 46.1% would not want to know the answer; this percentage increases to 53.9% among those over 50, with the intermediate age group in between. The absolute difference between the younger and the older group is 7.8 percentage points (95% CI = 2.43 to 13.17), a result that contradicts the temporal myopia hypothesis but is predicted by the time-to-event hypothesis.

All in all, these six tests support the time-to-event hypothesis. The limitation of these tests is that most of them rely on age as a proxy and are cross-sectional rather than following individuals over time or even the life course. Despite this limitation, in none of the tests did we find support for the temporal myopia hypothesis.

Individual differences. What explains individual differences in deliberate ignorance? To answer this question, we calculated logistic regressions for each of the 10 events, using wanting to know as the criterion and the variables in Table 3 as predictors. Possibly the most surprising result was a variable that did not explain individual differences: the level of education. Although Table 7 shows that higher education level, on its own, is associated with less deliberate ignorance, this effect disappears in the regression models for all 10 events (all p values $> .05$).[2] The major factors for individual differences are predicted by the proposed regret theory: risk aversion, buying insurance, and age, as described above.

Yet there was one additional factor that the regret theory does not cover, religious practice. Those who attend religious services more likely want to know. This result appears unexpected in the light of a common stereotyping of religious people as embracing belief instead of wanting to know, as exemplified in a famous quote from Nietzsche's *Antichrist*, "'Faith' means not wanting to know what is true." Similarly, a meta-analysis reported a weak negative correlation between church attendance and "openness to experience" (one of the Big-Five personality factors, Saroglou, 2002). If lower openness to experience implies higher deliberate ignorance for issues that could involve regret, our analysis shows the opposite. The only event where religious people are less likely to want to know is the sex of an unborn child, with a large margin of 17 percentage points. This effect is mainly due to the Spanish sample, and could have to do with the predominantly Catholic tradition in Spain.

All in all, the analysis of individual differences in deliberate ignorance reveals a fairly robust picture. The key predictors are risk aversion, buying insurance, age, and religious practice. People who want to know tend to be risk seeking for both gains and losses, buy fewer insurances, be younger, and attend religious services. In contrast, those who choose deliberate ignorance are characterized by risk aversion, buying insurance, being older, and not attending religious services.

General Discussion

In this article, we defined and analyzed the phenomenon of deliberate ignorance, that is, the willful decision not to want to know the answer to questions of personal relevance. We showed for 10 events of personal relevance that the phenomenon is widespread in two countries and proposed a regret theory to explain this flipside of human curiosity. Although Germany and Spain vary in age, education, and other important respects (Table 3; Gigerenzer et al., 2014), the pattern of deliberate ignorance was highly consistent across countries, including its prevalence, predictability, and the relation to risk aversion and buying insurance. The proposed theory covers both positive and negative events and specifies the conditions for deliberate ignorance, extending the work by Luce and Raiffa (1957). For negative events such as death and divorce, deliberate ignorance avoids the anticipated regret if the worst outcome proved to true. For positive events, it maintains suspense and surprise, thereby avoiding the regret that knowing the outcome would "spoil the punch line." Reluctance to search for information has been studied before, and in their overview, Sweeny et al. (2010) concluded that "many researchers are examining the topic of information avoidance, albeit haphazardly, but none appear to communicate with each other or even appear aware that others exist" (p. 340). As a step in the other direction, the proposed theory attempts to build a fundament for a systematic study of conditions under which people do not want to know.

In this final section, we discuss limitations and extensions of the present analysis.

Do Statements of Deliberate Ignorance Translate Into Behavior?

We have shown that events exist that a substantial proportion of people, according to their statements, do not want to know. A possible conjecture is that this phenomenon might be just a hypothetical preference and people might change their mind if the decision actually had to be made in real life and the technology for knowing existed. Although the technology for predicting individual deaths and divorces is still too unreliable for testing this conjecture, determining the sex of an unborn child is a case in point, where highly reliable technologies are available.

Thus, the critical question is, will parents still refuse to learn the sex of their unborn child at the moment of prenatal ultrasound or amniocentesis? The present study cannot answer this question, but other studies already have. In the Netherlands, 210 women attending an amniocentesis because of advanced maternal age were asked whether they wanted to know the sex of their child (Kooper et al., 2012). Thirty-one percent said they did not want to know, and the others did, which is in the same range as in the present study in Spain (35%) and Germany (40%). A subset of 148 women who had already given birth were asked whether they had actually known the fetal sex before the last birth; 45% of these women said that they had decided not to know. Among those who did not want to know, the most frequent reasons given were "surprise at birth"

[2] We checked whether this result could be due to the fact that the level of education was divided into five categories and reran the regression analysis with three categories, combining the two lowest and highest ones; however, the results were robust.

(94%) and "it is more fun not knowing" (92%). Among those who wanted to know, the most frequently stated reasons were "curiosity" (78%) and "because it is possible" (67%). At a large referral center in Boston, 1,340 women and partners were asked immediately before entering the examination room for obstetric ultrasound whether they wanted to know the sex of their fetus (Shipp et al., 2004). Forty-two percent of mothers and fathers did not want to know; the others did. The most common reason for not wishing to learn the sex were "surprise at birth and suspense" (73% and 67% of mothers and fathers, respectively), and the most common reason given for wanting to know was "planning and preparation" (40% and 28% of mothers and fathers, respectively).

These two studies do not support the hypothesis that stated deliberate ignorance does not translate into actual behavior. Although conducted in different cultures, the two studies find percentages of deliberate ignorance that are comparable to the present study, and the reasons given are consistent with the hypothesis that deliberate ignorance is motivated by maintaining the emotion of surprise and suspense. Both studies also reported that differences in the level of education do not explain differences in deliberate ignorance, in line with the two representative studies reported here. These results indicate that stated preferences for deliberate ignorance are not merely hypothetical but translate into behavior. In fact, some parents feel strongly about the value of surprise and suspense even when the diagnostic technology and results are available at no extra cost (Shipp et al., 2004).

Limitations

First, we have not dealt with the two other motives for deliberate ignorance: gaining a strategic advantage and implementing fairness and impartiality (see Figure 2). Whether the present theory can be extended to these motives remains to be investigated. Second, although we conducted tests of the behavior predicted by the proposed regret theory, including risk aversion and buying insurance, we did not directly test the relation between values and anticipated regret in Equation 2, which we based on Luce and Raiffa (1957), nor the assumption that the option with the maximum anticipated regret determines choice (Equation 3). Such tests could be performed by asking people how much regret they would feel for each possible outcome of an event, as done in earlier regret studies (e.g., Sorum et al., 2004). Research to this end goes beyond the scope of the present study.

A third limitation concerns the data for testing the time-to-event hypothesis. Most of our tests used age as a proxy, and the results excluded the temporal myopia hypothesis but not the hypothesis that age per se could cause the increase in deliberate ignorance. To study what the relative contribution of these two remaining hypotheses are, longitudinal studies are required that follow individuals' preferences over time and thereby separate the effect of decreasing time to an event from getting older. For instance, one could measure the change in women's preference for knowing the fetal sex over the course of their pregnancy and control for age by studying women in different age groups. These studies will also need appropriate controls for the effect of repeated questions.

A final limitation is that we do not know to what degree the present findings generalize to other events and cultures. We took care to obtain a representative sample of German citizens and a second one for Spaniards, yet, unlike for a population of people, there is no known procedure to define a population of significant personal events and draw a representative sample. Nevertheless, Conditions 1 to 4 define the general characteristics of the domain to which the present theory applies. Given this limitation, the present results should be seen as an existence proof of deliberate ignorance.

Extensions

The proposed theory follows Luce and Raiffa (1957) in that few assumptions are made about what an individual needs to know. All that suffices is to know the outcome that causes the highest anticipated regret, enabling decisions to be made when probabilities are unknown, unknowable, or unstable (Savage, 1951). The present theory could be extended to situations where probabilities are known and also known to remain stable. Almost all of the earlier work on regret has dealt with choices among monetary gambles, which embodies such a situation (e.g., Mellers et al., 1997; Mellers et al., 1999). For at least one of the events in the present study, the sex of a child, the probabilities are known. For such situations, the present theory could be extended in two ways. The first is to replace the minimax rule with a heuristic rule akin to the priority heuristic that sequentially searches through outcome and probability information in a lexicographic way (Brandstätter, Gigerenzer, & Hertwig, 2006, 2008). The second is to try to adapt the expected utility framework, as in Loomes and Sudgen (1982) and Mellers et al. (1997), to the topic of deliberate ignorance. Such extensions would have to deal with the fact that people tend to make different judgments depending on whether probabilities are numerically stated by the experimenter or estimated through sequential learning, a distinction known as *decisions from description* versus *from experience* (Hertwig & Erev, 2009).

A second extension concerns the nature of the approach–avoidance conflict (Condition 4). In the proposed theory, we assumed that for negative events, the unfavorable consequence of knowing is the negative feeling that may arise from foreknowledge of bad news, as in Cassandra's case. Yet there may be additional unfavorable consequences, including the anticipation that one might fail to act on the knowledge. For instance, a smoker who does not want to know the cause of his death might not only avoid the negative feeling arising from learning that he will die of lung cancer but also anticipate not having the will to quit smoking after learning the news. Because quitting could prolong the time before death from lung cancer (Doll, Peto, Boreham, & Sutherland, 2004), anticipating not being able to control his behavior would thus be another reason for regret, which might lead to deliberate ignorance. To the extent that this argument holds, people should show less deliberate ignorance in situations where they feel in control of their behavior.

The same extension could be made for positive events, that is, that the positive value of deliberate ignorance extends beyond surprise and suspense. As one reviewer suggested, not knowing the sex of their unborn child allows parents to savor both possibilities, a new daughter and a new son.

A third extension concerns the relation between anticipatory regret on the one hand and actual regret and behavior on the other, as discussed above for the case of fetal sex. The degree to which anticipated regret maps onto actual regret is a research question that directly links the present work to the research on affective

forecasting. Although the latter research has focused primarily on general happiness, a few studies have dealt with the emotion of regret. In one study, people who imagined having lost by a narrow margin in a pricing game reported higher regret than those who actually lost by a narrow margin (Gilbert, Morewedge, Risen, & Wilson, 2004); a second study reported the opposite result that people's anticipated regret was lower than the actual regret (Fernandez-Duque & Landers, 2008). Whatever the reasons for these diverging results are, it would be worthwhile to connect the research on affective forecasting with that of deliberate ignorance.

The Psychology of Not Wanting to Know

Wanting to know appears to be the natural condition of humankind, and in no need of justification. People are not just invited but also often expected to participate in early detection for cancer screening or in regular health check-ups, to subject their unborn babies to dozens of prenatal genetic tests, or to use self-tracking health devices. In a similar vein, the philosopher Rudolf Carnap argued that valid information should not be left on the table, and in much of decision theory, more information is always better, unless the cost of search exceeds its benefit (Stigler, 1961). Bayesian theories lead to the same view that new knowledge should be used to update the prior probabilities in order to make rational decisions (Good, 1967). Although these conclusions have since been qualified (e.g., Pedersen & Wheeler, 2014), in general, the default is that valid information should be sought for and used. Not wanting to know, in contrast, appears counterintuitive and irrational.

In this article, by contrast, we showed that deliberate ignorance exists. In fact, it is a widespread state of mind when dealing with issues such as death and divorce as well as the pleasurable events studied in this article. The regret theory of deliberate ignorance provides a foundation for understanding why this phenomenon may occur. By declining the powers that made Cassandra famous, one can forego the suffering that knowing the future may cause, avoid regret, and also maintain the enjoyment of suspense that pleasurable events provide.

References

Admati, A. R., & Hellwig, M. (2013). *The bankers' new clothes*. Princeton, NJ: Princeton University Press.

Albert, D., & Lukas, J. (Eds.). (1999). *Knowledge spaces: Theories, empirical research, applications*. Mahwah, NJ: Erlbaum.

Anderson, J. R. (1990). *The adaptive character of thought*. Hillsdale, NJ: Erlbaum.

Babul, R., Adam, S., Kremer, B., Dufrasne, S., Wiggins, S., Huggins, M., . . . Prevost, C. (1993). Attitudes toward direct predictive testing for the Huntington disease gene. Relevance for other adult-onset disorders. *Journal of the American Medical Association, 270,* 2321–2325. http://dx.doi.org/10.1001/jama.1993.03510190077030

Becker, G. S. (1993). The economic way of looking at behavior. *Journal of Political Economy, 101,* 385–409. http://dx.doi.org/10.1086/261880

Becker, G. S. (1995). An economic analysis of fertility. In R. Febrero & P. S. Schwartz (Eds.), *The essence of Becker* (pp. 241–272). Stanford, CA: Hoover Institution Press. (Reprinted from *Demographic and Economic Change in Developing Countries,* pp. 209–240, by National Bureau Committee for Economic Research, Ed., 1960, Princeton, NJ: Princeton University Press)

Bell, D. E. (1982). Regret in decision making under uncertainty. *Operations Research, 30,* 961–981. http://dx.doi.org/10.1287/opre.30.5.961

Brandstätter, E., Gigerenzer, G., & Hertwig, R. (2006). The priority heuristic: Making choices without trade-offs. *Psychological Review, 113,* 409–432. http://dx.doi.org/10.1037/0033-295X.113.2.409

Brandstätter, E., Gigerenzer, G., & Hertwig, R. (2008). Risky choice with heuristics: Reply to Birnbaum (2008), Johnson, Schulte-Mecklenbeck, and Willemsen (2008), and Rieger and Wang (2008). *Psychological Review, 115,* 281–289. http://dx.doi.org/10.1037/0033-295X.115.1.281

Cawthon, R. M., Smith, K. R., O'Brien, E., Sivatchenko, A., & Kerber, R. A. (2003). Association between telomere length in blood and mortality in people aged 60 years or older. *Lancet, 361,* 393–395. http://dx.doi.org/10.1016/S0140-6736(03)12384-7

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cumming, G. (2008). Replication and *p* intervals: *p* values predict the future only vaguely, but confidence intervals do much better. *Perspectives on Psychological Science, 3,* 286–300. http://dx.doi.org/10.1111/j.1745-6924.2008.00079.x

Doll, R., Peto, R., Boreham, J., & Sutherland, I. (2004). Mortality in relation to smoking: 50 years' observations on male British doctors. *British Medical Journal, 328,* 1519. http://dx.doi.org/10.1136/bmj.38142.554479.AE

Dylan, B. (1963). Blowin' in the wind. On *The freewheelin' Bob Dylan* [Record]. New York, NY: Columbia Records.

Ely, J., Frankel, A., & Kamenica, E. (2015). Suspense and surprise. *Journal of Political Economy, 123,* 215–260. http://dx.doi.org/10.1086/677350

Fernandez-Duque, D., & Landers, J. (2008). "Feeling more regret than I would have imagined": Self-report and behavioral evidence. *Judgment and Decision Making, 3,* 449–456.

Fischer, K., Kettunen, J., Würtz, P., Haller, T., Havulinna, A. S., Kangas, A. J., . . . Metspalu, A. (2014). Biomarker profiling by nuclear magnetic resonance spectroscopy for the prediction of all-cause mortality: An observational study of 17,345 persons. *PLoS Medicine, 11*(2), e1001606. http://dx.doi.org/10.1371/journal.pmed.1001606

Galison, P. (2004). Removing knowledge. *Critical Inquiry, 31,* 229–243. http://dx.doi.org/10.1086/427309

Gigerenzer, G. (1981). Analyse einer Analyse des Urteilprozesses bei der Personenbeschreibung [Analysis of an analysis of the judgment process in describing persons]. *Zeitschrift für Soziologie, 10,* 192–195. http://dx.doi.org/10.1515/zfsoz-1981-0205

Gigerenzer, G. (2014). *Risk savvy: How to make good decisions*. New York, NY: Viking.

Gigerenzer, G., Gaissmaier, W., Kurz-Milcke, E., Schwartz, L. M., & Woloshin, S. (2007). Helping doctors and patients make sense of health statistics. *Psychological Science in the Public Interest, 8,* 53–96.

Gigerenzer, G., Galesic, M., & Garcia-Retamero, R. (2014). Stereotypes about men's and women's intuitions: A study of two nations. *Journal of Cross-Cultural Psychology, 45,* 62–81. http://dx.doi.org/10.1177/0022022113487074

Gigerenzer, G., Hertwig, R., van den Broek, E., Fasolo, B., & Katsikopoulos, K. V. (2005). "A 30% chance of rain tomorrow": How does the public understand probabilistic weather forecasts? *Risk Analysis, 25,* 623–629. http://dx.doi.org/10.1111/j.1539-6924.2005.00608.x

Gilbert, D. T., Morewedge, C. K., Risen, J. L., & Wilson, T. D. (2004). Looking forward to looking backward: The misprediction of regret. *Psychological Science, 15,* 346–350. http://dx.doi.org/10.1111/j.0956-7976.2004.00681.x

Good, I. J. (1967). On the principle of total evidence. *The British Journal for the Philosophy of Science, 17,* 319–321. http://dx.doi.org/10.1093/bjps/17.4.319

Gottman, J. M., & Levenson, R. W. (2000). The timing of divorce: Predicting when a couple will divorce over a 14-year period. *Journal of Marriage and the Family, 62,* 737–745. http://dx.doi.org/10.1111/j.1741-3737.2000.00737.x

Guttman, L. (1944). A basis for scaling qualitative data. *American Sociological Review, 9,* 139–150. http://dx.doi.org/10.2307/2086306

Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin, 135,* 555–588. http://dx.doi.org/10.1037/a0015701

Hertwig, R., & Engel, C. (2016). Homo ignorans: Deliberately choosing not to know. *Perspectives on Psychological Science, 11,* 359–372. http://dx.doi.org/10.1177/1745691616635594

Hertwig, R., & Erev, I. (2009). The description-experience gap in risky choice. *Trends in Cognitive Sciences, 13,* 517–523. http://dx.doi.org/10.1016/j.tics.2009.09.004

Hogarth, R. (1987). *Judgment and choice* (2nd ed.). New York, NY: Wiley.

Janis, I. L., & Mann, L. (1977). *Decision making*. New York, NY: Free Press.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47,* 263–291. http://dx.doi.org/10.2307/1914185

Klayman, J., & Ha, Y. (1987). Confirmation, disconfirmation and information in hypothesis testing. *Psychological Review, 94,* 211–228. http://dx.doi.org/10.1037/0033-295X.94.2.211

Kooper, A. J. A., Pieters, J. J., Eggink, A. J., Feuth, T. B., Feenstra, I., Wijnberger, L. D. E., . . . Smits, A. P. T. (2012). Why do parents prefer to know the fetal sex as part of invasive prenatal testing? *ISRN Obstetrics and Gynecology, 2012,* 524537. http://dx.doi.org/10.5402/2012/524537

Kruglanski, A. W. (2004). *The psychology of closed mindedness*. New York, NY: Psychology Press.

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing." *Psychological Review, 103,* 263–283. http://dx.doi.org/10.1037/0033-295X.103.2.263

Lewin, K. (1951). *Field theory in social science: Selected theoretical papers*. New York, NY: Harper & Row.

Lewis, R. (2014, December 4). James Watson on "genetic losers". *PLOS Blogs*. Retrieved from http://blogs.plos.org/dnascience/2014/12/04/james-watsons-view-genetic-losers/

Locke, J. (1828). *An essay concerning human understanding*. London, England: Dove. (Original work published 1690)

Loewenstein, G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin, 116,* 75–98. http://dx.doi.org/10.1037/0033-2909.116.1.75

Loomes, G., & Sugden, R. (1982). Regret theory: An alternative theory of rational choice under uncertainty. *The Economic Journal, 92,* 805–824. http://dx.doi.org/10.2307/2232669

Luce, R. D., & Raiffa, H. (1957). *Games and decisions*. New York, NY: Dover.

McGoey, L. (Ed.), (2014). *An introduction to the sociology of ignorance*. London, England: Routledge.

Mellers, B. A., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science, 8,* 423–429. http://dx.doi.org/10.1111/j.1467-9280.1997.tb00455.x

Mellers, B. A., Schwartz, A., & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental Psychology: General, 128,* 332–345. http://dx.doi.org/10.1037/0096-3445.128.3.332

Melnyk, D., & Shepperd, J. A. (2012). Avoiding risk information about breast cancer. *Annals of Behavioral Medicine, 44,* 216–224. http://dx.doi.org/10.1007/s12160-012-9382-5

Miller, G. A. (1983). Informavores. In F. Machlup & U. Mansfield (Eds.), *The study of information: Interdisciplinary messages* (pp. 111–113). New York, NY: Wiley-Interscience.

Morini, E., Sangiuolo, F., Caporossi, D., Novelli, G., & Amati, F. (2015). Application of next generation sequencing for personalized medicine for sudden cardiac death. *Frontiers in Genetics, 6,* 55. http://dx.doi.org/10.3389/fgene.2015.00055

Pedersen, A. P., & Wheeler, G. (2014). Demystifying dilation. *Erkenntnis, 79,* 1305–1342. http://dx.doi.org/10.1007/s10670-013-9531-7

Proctor, R. N., & Schiebinger, L. (Eds.). (2008). *Agnotology. The making and unmaking of ignorance*. Stanford, CA: Stanford University Press.

Rawls, J. (1999). *A theory of justice*. Cambridge, MA: Harvard University Press.

Saroglou, V. (2002). Religion and the five factors of personality: A meta-analytic review. *Personality and Individual Differences, 32,* 15–25. http://dx.doi.org/10.1016/S0191-8869(00)00233-6

Savage, L. J. (1951). The theory of statistical decision. *Journal of the American Statistical Association, 46,* 55–67. http://dx.doi.org/10.1080/01621459.1951.10500768

Schelling, T. C. (1956). An essay on bargaining. *The American Economic Review, 46,* 281–306.

Schooler, L. J., & Hertwig, R. (2005). How forgetting aids heuristic inference. *Psychological Review, 112,* 610–628. http://dx.doi.org/10.1037/0033-295X.112.3.610

Shipp, T. D., Shipp, D. Z., Bromley, B., Sheahan, R., Cohen, A., Lieberman, E., & Benacerraf, B. (2004). What factors are associated with parents' desire to know the sex of their unborn child? *Birth: Issues in Perinatal Care, 31,* 272–279. http://dx.doi.org/10.1111/j.0730-7659.2004.00319.x

Sorum, P. C., Mullet, E., Shim, J., Bonnin-Scaon, S., Chasseigne, G., & Cogneau, J. (2004). Avoidance of anticipated regret: The ordering of prostate-specific antigen tests. *Medical Decision Making, 24,* 149–159. http://dx.doi.org/10.1177/0272989X04263163

Stevens, J. R. (2016). Intertemporal similarity: Discounting as a last resort. *Journal of Behavioral Decision Making, 29,* 12–24. http://dx.doi.org/10.1002/bdm.1870

Stigler, G. J. (1961). The economics of information. *Journal of Political Economy, 69,* 213–225. http://dx.doi.org/10.1086/258464

Sweeny, K., Melnyk, D., Miller, W., & Shepperd, J. A. (2010). Information avoidance: Who, what, when, and why. *Review of General Psychology, 14,* 340–353. http://dx.doi.org/10.1037/a0021288

Thornton, R. L. (2008). The demand for, and impact of, learning HIV status. *The American Economic Review, 98,* 1829–1863. http://dx.doi.org/10.1257/aer.98.5.1829

World Health Organization. (2015). *Global Health Observatory Data Repository: Life expectancy—Data by country*. Geneva, Switzerland: Author. http://apps.who.int/gho/data/node.main.688?lang=en

Yaniv, I., Benador, D., & Sagi, M. (2004). On not wanting to know and not wanting to inform others: Choices regarding predictive genetic testing. *Risk, Decision, and Policy, 9,* 317–336. http://dx.doi.org/10.1080/14664530490896573

Zeelenberg, M. (1999). Anticipated regret, expected feedback and behavioral decision-making. *Journal of Behavioral Decision Making, 12,* 93–106. http://dx.doi.org/10.1002/(SICI)1099-0771(199906)12:2<93::AID-BDM311>3.0.CO;2-S

Zeelenberg, M., Beattie, J., van der Pligt, J., & de Vries, N. K. (1996). Consequences of regret aversion: Effects of expected feedback on risky decision making. *Organizational Behavior and Human Decision Processes, 65,* 148–158. http://dx.doi.org/10.1006/obhd.1996.0013

Received December 21, 2015
Revision received November 16, 2016
Accepted November 18, 2016 ■