

Remembering Makes Evidence Compelling: Retrieval From Memory Can Give Rise to the Illusion of Truth

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The *illusion of truth* is traditionally described as the increase in perceived validity of statements when they are repeated (Hasher, Goldstein, & Toppino, 1977). However, subsequent work has demonstrated that the effect can arise due to the increased familiarity or fluency afforded by repetition and not necessarily to repetition per se. We examine the case of information retrieved from memory. Recently experienced information is expected to be subsequently reexperienced as more fluent and familiar than novel information (Jacoby, 1983; Jacoby & Dallas, 1981). Therefore, the possibility exists that information retrieved from memory, because it is subjectively reexperienced at retrieval, would be more fluent or familiar than when it was first learned and would thus lead to an increase in perceived validity. Using a method to indirectly poll the perceived truth of factual statements, our experiment demonstrated that information retrieved from memory does indeed give rise to an illusion of truth. The effect was larger than when statements were explicitly repeated twice and was of comparable size to when statements were repeated 4 times. We conclude that memory retrieval is a powerful method for increasing the perceived validity of statements (and subsequent illusion of truth) and that the illusion of truth is a robust effect that can be observed even without directly polling the factual statements in question.

Keywords: memory retrieval, familiarity, fluency, repetition, inferences

There is nothing so absurd that it cannot be believed as truth if repeated often enough.

—William James

Repetition has long been known to have persistent effects on human cognition. For example, repetition of stimuli can lead to increased subjective ratings of liking (Harrison, 1977; Zajonc, 1968) and increased attitude change in response to repeated persuasive messages (Cacioppo & Petty, 1979; Weiss, 1971). One specific case of cognitive change in the face of repetition is known as the *illusion of truth*. The illusion of truth is the finding that repetition of factual statements increases the perceived validity of those statements (Arkes, Hackett, & Boehm, 1989; Bacon, 1979; Hasher, Goldstein, & Toppino, 1977). Although the illusion of truth is usually characterized as arising due to repetition, follow-up research has demonstrated that explicit repetition is not a necessary condition for the effect.

Some of the earliest work to scrutinize the repetition assumption was that of Bacon (1979). Bacon examined the impact of subjectively judged repetition. In Bacon's studies, participants both rated the believability of statements and judged whether statements were repetitions. Bacon found that whether statements were actually repeated was irrelevant; the effect emerged whenever participants subjectively judged statements to be repetitions. From this work, researchers have suggested that the illusion of truth is driven more by the familiarity of statements than by repetition per se. Further support for this assumption comes from Begg, Armour, and Kerr (1985), who found that participants were more likely to endorse facts that were of a familiar topic than an unfamiliar topic. Conversely, Arkes et al. (1989) found that no illusion of truth effect occurred in domains of which participants claimed not to be knowledgeable. Together, these studies suggest that familiarity may be an important factor modulating the illusion of truth.

Reber and Schwarz (1999) came to similar conclusions regarding familiarity via manipulations of the perceptual fluency of statements. Perceptual fluency work (e.g., Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby, & Girard, 1990) has demonstrated that stimuli that are easier to perceive (e.g., blue or red text on a white background) can elicit greater feelings of familiarity than stimuli that are more difficult to perceive (e.g., yellow or light blue text on a white background). Using this perceptual fluency manipulation, Reber and Schwarz demonstrated that an illusion of truth-like effect arose when statements gave rise to a sense of familiarity (i.e., were easy to perceive). This suggests that repetition is not necessary for the illusion of truth to occur.

Although some researchers have found that repetitions can increase subjective ratings of validity independent of the increased familiarity afforded by repetitions (Begg, Anas, & Farinacci, 1992; Brown & Nix, 1996), the consensus is that so long as familiarity of the statements is enhanced, the illusion of truth can occur in the absence of explicit repetitions. Thus, enhanced familiarity with

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statements, whether or not the result of explicit repetition, can increase the perceived validity of statements. This leads to an interesting prediction regarding the possible impact of memory retrieval, in the absence of repetition, on the illusion of truth. That is, to rate statements that are no longer explicitly available, participants must retrieve those statements from memory. Because those statements were recently experienced, they should be reexperienced (i.e., retrieved) as subjectively more familiar than when they were first read (Jacoby, 1983; Jacoby & Dallas, 1981). Hence, on the basis of research demonstrating that increased familiarity and fluency can lead to the illusion of truth, we would expect the illusion of truth to occur for information that is simply retrieved from memory, in the absence of explicit repetition. In other words, memory retrieval may offer a simple mechanism with which to increase the perceived validity of statements and thus produce an illusion of truth effect after only a single presentation. Presenting a statement only once to participants may lead to an illusion of truth when subjective ratings are delayed and no illusion of truth when ratings are immediate. Memory retrieval therefore may be a potentially powerful way to increase the subjective believability of information and may subsequently have a significant impact on future inferences. The present work tested this hypothesis.

Present Experiment

As noted above, past studies of the illusion of truth effect have found that repetition of statements increases explicit ratings of validity (e.g., Bacon, 1979; Hasher et al., 1977). To examine the effect of memory retrieval in the absence of explicit repetition on the illusion of truth, however, one must present participants with factual statements to learn and later cue them to rate those statements, without re-presenting the specific statements that were learned as cues. Thus, in the present experiment participants read a series of factual statements that were relatively neutral in terms of believability. We constructed inference statements, which the factual statements could either support or refute, as a proxy for the perceived validity of the factual statements. Participants were told to rate the accuracy of the inference statements, based on the factual statements that they read previously. If participants perceive repeated statements to be more truthful, the increased perceived "truthfulness" of those statements should impact future inferences (i.e., if evidence is believed to be more accurate, it should be relied on more heavily when making decisions). Thus, by examining the degree to which ratings for the inference statements change as a function of repetition or memory retrieval, we can indirectly ascertain how truthful participants perceive the factual statements to be, without explicitly repeating those statements.

The present experiment is the first instance in which the believability of factual statements was indirectly polled via its impact on inferences. Although it logically follows that statements that are viewed as more believable by participants should be more readily used to make inferences, whether this is the case is an empirical question. Hence, our first goal in the present experiment was to replicate the illusion of truth by using indirect ratings of inferences based on factual statements, rather than by directly polling participants' subjective beliefs about the factual statements.

The present experiment contained four conditions. In the control condition, the inference and factual statements were presented

simultaneously, and participants rated how accurate the inference statements were, based on the factual statements. This condition provides a measure of how much the factual statements influenced the inference ratings, in the absence of repetition or memory retrieval.

The two-repetition condition was a replication of the control condition except that before the inference task, participants were preexposed to all the factual statements once. Therefore, during the inferences rating task, when the factual statements were presented to participants, it was actually the second time that those statements were viewed. The four-repetition condition was identical to the two-repetition condition except that participants were preexposed to all factual statements three times. Thus, during the inferences rating task, when the factual statements were presented to participants, it was the fourth time those statements were viewed. Thus, in the repetition conditions, all factual statements viewed during the inferences task were repetitions from the preexposure phase. On the basis of past work, we expected that participants would perceive these factual statements to be more true than would participants in the control condition. Therefore, if our paradigm is sound, inference statement ratings (based on the factual statements) should become more exaggerated in the repetition conditions than in the control condition.

Finally, the retrieval condition was a replication of the two-repetition condition, with the exception that the factual statements were omitted during the inferences task. That is, participants were preexposed to each factual statement once, but during the inference rating task no factual statements were presented. Participants were still told to make their decisions based on factual statements to which they were preexposed, but in this case, no explicit repetition of those statements was provided. Instead, participants had to retrieve the relevant factual statements from memory. As previous work suggests that recently experienced stimuli are subsequently processed more fluently and give rise to a greater sense of familiarity (Jacoby, 1983; Jacoby & Dallas, 1981) and enhanced familiarity can drive the illusion of truth in the absence of repetition (Bacon, 1979; Begg et al., 1985; Reber & Schwarz, 1999), we predicted that the retrieval condition would show an effect on inferences comparable to that of the repeated conditions. If an illusion of truth effect were found in this condition, it would be a powerful demonstration of the effect, and of memory retrieval in general, as the illusion of truth effect would have arisen with only a single presentation of each factual statement.

Method

Participants

Participants were 257 individuals from the University of Waterloo. There were 47 in the control condition, 91 in the two-repetition condition, 77 in the four-repetition condition, and 42 in the retrieval condition.

Materials

The factual and inference statements used were selected from a larger, prerated set (see Appendix). In the prerating tasks, 47 participants rated the believability of the factual statements, and 36 rated the accuracy of the inference statements in the absence of any

factual statements. These 83 participants did not overlap with those who participated in the experiment.

The prerating data indicated the degree to which a factual statement was rated as believable on a 7-point Likert scale, with 7 being completely believable and 1 being completely unbelievable. The prerating data for the inference statements indicated the baseline degree to which each inference statement was endorsed as accurate on a 7-point Likert scale, with 7 being completely accurate and 1 being completely inaccurate.

We selected 24 factual statements with a mean believability rating of 3.53 ($SD = 0.55$). Each factual statement corresponded to one inference statement (i.e., a factual statement could either support or refute a single inference statement). The mean accuracy rating of the corresponding inference statements was 3.23 ($SD = 0.83$). Thus, inference statements were, on average, relatively neutral in terms of judged accuracy, allowing optimal room for inference statement ratings to move toward the extremes of the Likert scale, in the presence of factual statements.¹

Procedure

Participants completed the experiment on the Internet. For the control condition, on each trial, participants saw a factual statement and an inference statement simultaneously in black, 12-point font against a white background. Participants' task was to read both statements and to judge how accurate the inference statement was, based on the factual statement provided. A 7-point Likert scale was presented below both statements, and participants were to use this scale to indicate the accuracy of the inference statement, with 1 indicating highly inaccurate and 7 indicating highly accurate.

For the repetition conditions, participants were first presented with a list of factual statements. Factual statements were presented individually on the screen, and participants were told to read each statement and then click on an *OK* button to proceed. Individual statements remained on the screen until participants pressed *OK*; thus, presentation duration was participant paced. In the two-repetition condition, each factual statement was presented once, in the four-repetition condition, each factual statement was presented three times, each on separate trials. Hence, in the two-repetition condition there were 24 trials of preexposure and in the four-repetition condition there were 72 trials of preexposure. The order of presentation of items in both conditions and both preexposure and inference rating phase was completely randomized.

After this study phase, participants saw each inference statement presented simultaneously with the relevant factual statement. Again, participants were to read both statements and judge how accurate the inference statements were, based on the factual statements provided. After the statement was rated, the next factual and inference statement pair was presented. Finally, the retrieval condition operated identically to the two-repetition condition except that when inference statements were being rated, factual statements were not presented. Thus, participants had to retrieve the factual statement from memory to judge the inference statement.

After the inference rating phase, participants engaged in an old/new recognition memory test. The studied factual statements were randomly intermixed with an equal number of new statements, and participants had to identify which statements were old and which were new. Participants also rated their confidence with

each rating on a 7-point Likert scale, with 7 being highly confident and 1 being highly not confident. The order of the statements or statement/inference pairs in all phases was randomly determined.

Results and Discussion

An alpha level of .05 was our criterion for significance in all significance tests. Effect size estimates were computed with eta squared, partial eta squared (η_p^2), or Cohen's *d*, where appropriate. The results of the memory test in the retrieval condition can be seen in Table 1. Participants could reliably discriminate old from new factual statements, $F(1, 41) = 929.34$, mean standard error (MSE) = 0.02, $\eta_p^2 = .96$. Confidence for these attributions was also exceptionally high (approaching the upper limit of the 7-point scale) and did not differ between old and new items ($F < 1$). Therefore, we can be assured that very little forgetting occurred in the retrieval condition.

The primary measure of interest was participants' reliance on factual statements, as estimated by how participants' preratings changed depending on the factual statements. Recall that preratings of the inference statements were relatively neutral (i.e., near the midpoint of the 7-point scale). Factual statements should shift participants away from the midpoint of the scale (as each factual statement either supported or refuted an inference statement), and the degree to which participants move away from the midpoint of the scale should be influenced by how compelling (i.e., truthful) the factual statements are perceived to be. If factual statements are highly compelling, participants should shift farther away from the center of the scale than if the factual statements are not perceived to be very compelling.

To estimate the extremity of responses to the inference statements, we coded factual statements as either positive or negative depending on whether they supported or refuted inference statements. For each participant's rating of individual inference statements, we calculated the relative difference between those ratings and the mean prerated values, with positive values indicating a shift in the correct direction (i.e., a positive shift based on positive evidence or a negative shift based on negative evidence) and negative values indicating a shift in the incorrect direction (i.e., a positive shift based on negative evidence or a negative shift based on positive evidence). For each participant then, we obtained a mean relative inference change score, which indicated, on average, how much more extreme that participant's ratings were than the preratings (i.e., than rating in the absence of evidence). Larger positive relative inference change scores indicate that participants were more compelled in the correct direction by the factual statements.

Relative inference change scores for the four conditions are provided in Figure 1. First, one-sample *t* tests testing relative inference change scores against zero revealed a significant effect for all four conditions ($ts > 8.36$). This demonstrates that in all conditions, there was a significant positive difference in inference ratings compared to the prerating values. Thus, all evidence conditions (i.e., control, two-repetition, four-repetition, and retrieval)

¹ It should be noted that the factual statements were not necessarily true (as can be seen in the Appendix). Again, they were selected to be relatively neutral in terms of believability, rather than highly accurate.

Table 1
Means and Standard Errors for Recognition Memory and Confidence Ratings of Old and New Factual Statements From the Retrieval Condition

Value	p("old")		Confidence	
	Old	New	Old	New
<i>M</i>	0.93	0.02	6.49	6.49
<i>SE</i>	0.02	0.01	0.10	0.11

led to larger inference ratings than in the preratings, where no evidence was provided. Furthermore, because all relative inference change scores were positive, the mean increased ratings were all in the direction that the evidence supported.

In terms of between-conditions comparisons, an omnibus analysis of variance revealed a significant difference of relative inference change scores between groups, $F(1, 257) = 5.17$, $MSE = 0.40$, $\eta^2 = .06$. The two-repetition condition showed a larger numerical effect on inferences than the control condition; however, this effect was nonsignificant, $t(136) = 0.94$, $p = .35$, $d = 0.16$. Thus, a single repetition was not enough to give rise to the illusion of truth in this paradigm. However, the four-repetition condition did demonstrate the illusion of truth, showing greater inference change scores than both the control and two-repetition conditions, $t(122) = 2.80$, $d = 0.51$ and $t(166) = 2.06$, $d = 0.32$, respectively. Thus, the four-repetition condition extends past work (e.g., Bacon, 1979; Hasher et al., 1977) by showing that participants not only rate repeated statements as more truthful or valid but also rely more on those statements more when making decisions. However, this effect was significant only when statements were repeated multiple times (i.e., in this case, four times).

Most important in terms of the present investigation, the retrieval condition was also found to exaggerate inference ratings beyond both the control condition and the two-repetition condition, $t(87) = 3.45$, $d = 0.74$ and $t(131) = 2.76$, $d = 0.48$, respectively, thus demonstrating that the illusion of truth effect can occur in the absence of explicit repetition. Furthermore, although the retrieval condition had a numerically larger effect than the four-repetition condition, this effect was not statistically significant, $t(117) = 1.15$, $d = 0.22$. Although this difference was nonsignificant, it is important to remember that factual statements were presented four times in the four-repetition condition, including while inferences were being rated, but were presented only once in the retrieval condition, and not while inferences were being rated. That is, although factual statements were presented much more often and also at the most critical point (i.e., during inference ratings) in the four-repetition condition, the retrieval condition gave rise to an illusion of truth effect that was, at the least, the same size as that for the four-repetition condition. Thus, these results demonstrate the sheer power of memory retrieval in giving rise to the illusion of truth.

General Discussion

The illusion of truth is the finding that repeated statements are perceived as more truthful than statements presented only once. A more careful examination of this effect, however, has shown that

it arises when participants simply perceive that statements have been repeated (Bacon, 1979), when information is familiar (Begg et al., 1985), and when information is fluently processed (Reber & Schwarz, 1999). Our research adds to this body of literature by demonstrating that memory retrieval is a powerful mechanism influencing the perceived truthfulness of evidence. That is, information that is read only once can give rise to a powerful illusion of truth effect, if the validity of that information is polled after initial exposure such that one needs to rely on memory. Furthermore, this effect is at least of equivalent size to four explicit presentations of exactly the same information.

Perhaps the most central question arising from these findings is, Why does memory retrieval lead to an illusion of truth-like effect? The possibility discussed thus far is that memory retrieval may act as a sort of covert repetition, inasmuch as the retrieval of information can be equated to a subjective repetition. Hence, when a statement is retrieved from memory, because it was recently experienced, it is subsequently reexperienced more fluently. This leads to an increase in subjective familiarity, which in turn leads to a greater influence on inferences. Although simple, one issue with this explanation is the fact that the effect size observed in the retrieval condition was at least equivalent to four explicit repetitions suggests that something beyond just a subjective repetition must be at play.

An alternate explanation for our findings is that information that is represented in memory is necessarily more fluent and familiar than information that is perceived. That is, it may be that memory retrieval leads to an illusion of truth-like effect, not necessarily because retrieval acts as a covert repetition but because information represented in memory is more fluently processed than information that is perceived. Researchers have shown, consistent with this idea, that information easily retrieved from memory is naturally viewed as disproportionately more important and influential to participants. For example, in a review of past work Schwarz (2004) highlighted findings that showed the ease of recall of

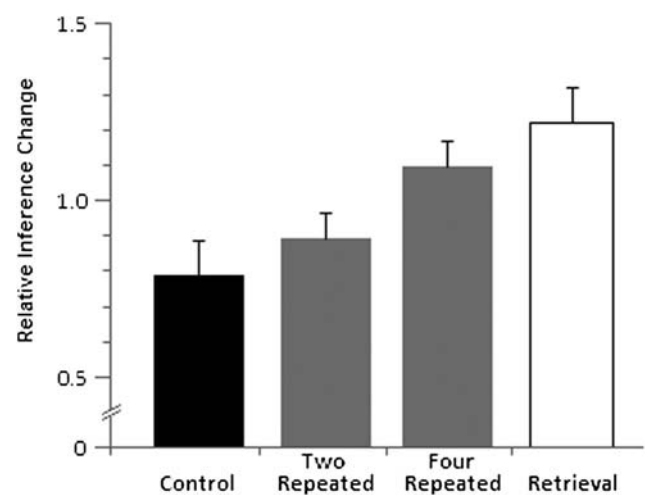


Figure 1. Mean (and standard error) of relative inference change scores by condition. Zero indicates no change from prerating values, where inferences were rated in the absence of any evidence. Positive values indicate evidence led to inference ratings that were more extreme in the direction that the evidence supported.

information was positively related to the perceived importance of information. Hawkins and Hoch (1992) demonstrated directly that easily recalled statements are rated as more truthful than harder to recall statements. More recently, Labroo, Lambotte, and Zhang (2009) used the name-ease effect to demonstrate that when participants associate the ease of processing information with the memorability of that information, the perceived importance of that information increases. As a whole, this past work shows that information that is easily retrieved, or simply perceived as easy to retrieve, is also perceived to be more important and influential to participants.

If this account is correct, the current work demonstrates that information retrieved from memory can not only be viewed as relatively more important than more difficult to retrieve information but can also be viewed as more important than information that is explicitly provided. In particular, information that is retrieved from memory may actually be more fluently processed in general than information that is directly perceived. Such a suggestion is consistent with work that has demonstrated that self-generated information is more convincing (e.g., Greenwald, 1968; Miller & Wozniak, 2001) and more memorable (e.g., Slamecka & Graf, 1978) and that it may arise because information that is retrieved from memory is already represented in the very cognitive system that must interpret it. In contrast, information that is perceived must first be encoded and then decoded into the cognitive system before it can be understood and, thus, may not be processed as fluently. Although this account can better explain our results than the covert-repetition account, an important avenue for future research will be to differentiate these two possibilities.

A further implication of our work that has not yet been highlighted regards the instructions that were used during the inference rating task. Participants in all conditions, even the control condition, were instructed to treat the factual statements as true, regardless of what they actually thought, when making their inference ratings. One consequence of these instructions is that they may have made the baseline influence of evidence larger in all conditions than it would be in other studies where participants are not given specific instructions as to how to treat the evidence. It is thus possible that we might have made it particularly difficult to observe any differences between our control condition and our experimental conditions. If participants in the control condition were treating factual statements as true, we could imagine, there would be very little room left for the illusion of truth to further increase the perceived truth of statements. Indeed, this may explain why a two-repetition condition did not show a significant illusion of truth effect when compared to the control condition. Nonetheless, the fact that the illusion of truth was observed in both the four-repetition condition and the retrieval condition is a testament to the power and robustness of the effect itself, even under high task demands.

Finally, another novel aspect of our work is the demonstration that a direct polling of the believability of factual statements is not necessary to assess the illusion of truth. Recall that the illusion of truth is defined as the increase in perceived believability of repeated versus nonrepeated statements. We have demonstrated here that this effect generalizes beyond direct polling of the believability of factual statements. The current work demonstrates that participants actually rely on repeated factual statements to a

greater degree when making inferences than nonrepeated, nonretrieved statements.

It should be pointed out that the paradigm presented here does share some similarities with Experiment 2 from Bacon (1979). In that experiment, Bacon presented evidence statements to participants, and statements either repeated or were replaced with contradictory statements. Bacon found that if participants noticed that new statements contradicted older statements, these new statements were rated as less accurate than if they were misidentified as repetitions of previous statements. Thus, there is some basis in the previous literature to believe that the illusion of truth extends beyond simply rating the accuracy of the evidence statements themselves and into more complex decisions such as inferences. However, our work is the first to thoroughly delineate this issue and address how multiple presentations of the same evidence and retrieval of evidence from memory can affect later decisions. Thus, the current work demonstrates the robustness of the illusion of truth and expands the paradigms with which the effect can be considered.

In conclusion, these results demonstrate that the illusion of truth can occur via memory retrieval and in the absence of explicit repetition. If the illusion of truth arises due to the familiarity and fluency of repeated factual statements, this may suggest that information retrieved from memory is naturally more familiar and fluent than information that is perceived. Finally, our study demonstrates that the illusion of truth is a robust effect: It can arise even in the face of task demands that might reduce its impact. It is not limited to direct ratings of the believability of factual statements but extends to more complicated decision-making scenarios relying on factual statements; thus, it can be polled indirectly. Retrieval from memory is a new and powerful method with which to easily give rise to the illusion of truth.

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(Appendix follows)

Appendix

Preratings for Evidence Statements and Corresponding Inference Statements

Evidence statement	Believability rating	Inference statement	Prerating accuracy
A dime has 15 ridges around the edge	2.89	It's pretty hard to count all the ridges on a dime	4.50
A person uses 8 sheets of toilet paper each day	3.26	People use only one or two pieces of toilet paper each time they go to the washroom	2.14
A toilet has 100 times more bacteria than an office desk	3.82	Toilets are infested with more bacteria than other areas in the house or workplace	3.36
The life span of a dollar bill is 1 and 1/2 years	2.84	Paper money is usually replaced every couple of years	3.75
The average North American car contains 2,000 pounds of plastics	3.09	Most of the weight in cars nowadays is from plastics	2.83
49% of a person's income is spent on transportation	3.41	For most people, transportation costs are easily afforded	2.67
In 1991, the first Wal-Mart opened up in Rogers, Arkansas	3.23	Wal-Mart is a relatively new company	4.58
85% of kids in the USA are overweight	4.16	Being overweight is still more uncommon for children than being a healthy weight	3.75
The average person falls asleep in 12 minutes	4.36	People usually fall asleep pretty quickly when they go to bed at night	3.83
The stomach of an adult can hold 20 liters of material	2.93	One jug of pop is enough to fill up an adult's stomach	4.14
Roses need 20 minutes of sunlight per day to grow properly	4.18	Roses can grow even with very little sunlight	3.31
4% of injuries by athletes involve the wrist and hand	3.42	Common injuries for athletes involve hands and wrists	4.67
6% of Americans eat breakfast everyday	3.07	No one really eats breakfast every day	2.31
80% of households have oatmeal in their kitchen	4.13	It is incredibly rare to find a household that doesn't have oatmeal in it	3.17
A crocodile can run up to a speed of 16 kilometers per hour	4.39	Crocodiles can run at highway speeds because they're so low to the ground	2.08
95% of Americans don't know that the sun is a star	3.65	Only scientists tend to know that the sun is a star	4.08
90% of the states in the United States have severe or extreme pollution problems	4.11	Pollution still isn't a major problem for most of the states in the US	2.67
62% of the people who use personal ads for dating are already married	3.07	If you meet a person from a personal ad, chances are they are already married	2.67
99% of accidental deaths occur in the home	2.84	You're more likely to die during work, school, or in transit than at home	3.81
79% of babies are born on their actual due date	3.80	Doctors are remarkably accurate in predicting the exact day a baby will be born	3.17
92% of lottery players go back to work after winning the jackpot	4.28	Pretty much no one quits their job when they win the jackpot in a lottery	3.25
40% of people end up marrying their first love	3.84	The reason most marriages end in divorce is that most people marry their first love	2.03
In the United States, 87% of land is covered by forests	2.85	If you drive across the US, most of the drive you will be driving through forests	2.19
James Bond made his debut in the 1765 novel <i>Casino Royale</i>	3.11	The first James Bond tale was written hundreds of years ago	2.50

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