Illusory Truth Occurs Even with Incentives for Accuracy

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Abstract

Fake news sites, politicians, and advertisers often make false claims believable by repeating them. Repeated statements feel easier to process, and thus truer, than new ones. In two large experiments ($N = 1188$), we investigated whether monetary incentives for accuracy reduce this *illusory truth effect*. Repetition misled people regardless of whether they could earn money for correct answers. The illusion occurred even when participants received item-by-item reminders about possible rewards. Our findings suggest that motivation is not always enough to disengage people from using heuristics to evaluate truth, with implications for a “post-truth world.”

Keywords: incentives, illusory truth, fluency

Illusory Truth Occurs Even with Incentives for Accuracy

Hearing the same claim multiple times makes it believable (Hasher et al., 1977; see Unkelbach et al., 2019, for a review). We can harness this *illusory truth effect* for good – repeating facts about COVID-19 (e.g., *Hypertension is a predictor for intensive care unit admission after a coronavirus infection*), for example, increases belief in them (Unkelbach & Speckmann, 2021). But repetition also makes misinformation, including fake news headlines (e.g., *Trump on revamping the military: We're bringing back the draft*; Pennycook et al., 2018), seem truthful.

Even a single exposure to a statement is persuasive (Hassan & Barber, 2021). In fact, simply seeing a topic (e.g., hen's body temperature) increases belief in new details (e.g., *The temperature of a hen's body is about 104°F*; Begg et al., 1985). Moreover, presenting a claim like *Crocodiles sleep with their eyes open* leads people to believe direct contradictions (e.g., *Crocodiles sleep with their eyes closed*) a week later (Garcia-Marques et al., 2015). People forget the details of the initial statement, instead inferring truth from *fluency*, or how easy it feels to process key concepts like 'crocodiles.'

This subjective experience of easy processing inflates belief in repeated claims (Wang et al., 2016), statements presented in easy-to-read fonts (e.g., **The capital of Madagascar is Toamasina**; Reber & Schwarz, 1999), and aphorisms that rhyme (e.g., *What sobriety conceals, alcohol reveals*; McGlone, & Tofigbakhsh, 2000). Fluency proves to be an insidious influence on our judgments – the illusory truth effect has replicated dozens of times (see Dechêne et al., 2010, for a meta-analysis) for content ranging from sociopolitical opinions (e.g., *Providing low rent housing to those on welfare only encourages these people not to work*; Arkes et al., 1989) to product claims (e.g., *Crest toothpaste removes caffeine stains from teeth*; Johar & Roggeveen,

2007). The illusion persists months after initial exposure (Brown & Nix, 1996), despite explicit warnings (Nadarevic & Aßfalg, 2017), and when claims come from sources that participants can identify as unreliable (Henkel & Mattson, 2011).

Surprisingly, illusory truth also emerges when we ‘know better.’ Repetition misleads intelligent people (De keersmaecker et al., 2020) and those who receive conflicting advice from a source described as 100% accurate (Unkelbach & Greifeneder, 2018). Moreover, contradictions of well-known facts like *Deer meat is called veal* seem truer the second time we encounter them – even though we know that the term is venison, not veal (Brashier et al., 2017; Fazio et al., 2015). Repeating even highly implausible statements (e.g., *Benjamin Franklin lived to be 150 years old*) may make them seem credible (Fazio et al., 2019).

Given how insidious fluency is, can we intervene to reduce illusory truth? Asking people to behave like ‘fact checkers’ prompts them to draw on their own knowledge. Brashier and colleagues (2020) asked people to initially make either interest or truth ratings. Focusing on accuracy at exposure wiped out the illusion later, but only when participants had relevant facts stored in memory. Encouragingly, the benefits of an accuracy focus extend to impressions of fake headlines (Calvillo & Smelter, 2020).

Another successful approach involves cautioning people that they will encounter false information. Jalbert and colleagues (2020) noted that most experimenters instruct participants that they will see both true and false statements. This simple warning, which rarely occurs in daily life, cuts the illusion in half. In the present research, we explored whether paying people to be accurate leads to a similar level of skepticism. Speckmann and Unkelbach (2021) found that monetary incentives reduce another semantic illusion, where people answer the question *How many animals of each kind did Moses take on the Ark?* with “two;” participants make this error

even though they likely know that Noah, not Moses, took animals on the Ark. Participants who could earn rewards for correct answers made fewer responses consistent with the Moses illusion.

In two preregistered experiments ($N = 1189$), we tested whether monetary rewards can also reduce reliance on fluency. Participants initially rated statements for interest, then judged the truth of these statements and new items. In the *incentive condition*, participants read at the beginning of the truth rating phase (Experiment 1) or item by item (Experiment 2) that they could earn a bonus if a randomly selected answer was correct. In the *standard condition*, participants evaluated claims without the possibility of earning a bonus. All data and materials are available online (osf.io/tb3hk).

Experiments 1 and 2

Method

Participants. In Experiment 1, 602 Amazon Mechanical Turk (MTurk) workers (262 women; M age = 36.76 years) participated for compensation. In Experiment 2, 586 MTurk workers (185 women; M age = 35.39 years) participated for compensation. Our preregistrations are available on OSF (osf.io/tb3hk).

Design. These experiments had a 2 (condition: standard, incentive) $\times$ 2 (repetition: repeated, new) mixed design. Condition was manipulated between subjects, while repetition was manipulated within subjects.

Materials. We selected 16 facts from Tauber, Dunlosky, Rawson, Rhodes, and Sitzman's (2013) general knowledge norms that were likely to be unfamiliar (on average, recalled correctly by 1% of norming participants), then took an additional 16 items of similar difficulty from Wang, Brashier, Wing, Marsh, and Cabeza (2016). We converted half of the facts (e.g., *Angel Falls is located in Venezuela*) into false statements by referring to plausible, but

incorrect, alternatives (e.g., *Angel Fall is located in Brazil*). Given the difficulty of the items, we expected true and false items to seem similarly credible to participants (see Table 1). Our full materials are available on OSF (osf.io/tb3hk).

Table 1

Sample Statements

	Statement
True	The author of "The Stranger" is Camus.
	The brightest star in the sky excluding the sun is Sirius.
	Young alpacas are called crias.
False	The twenty-first U.S. president was Garfield.
	The rubber roller on a typewriter is called the bell.
	The hobby of collecting postcards is phillumeny.

We divided the statements into two sets of 16 items. One set repeated across exposure and truth rating phases, whereas the other appeared for the first time at test. Repetition was counterbalanced across participants.

Procedure. After giving informed consent, participants completed the *exposure phase*. They indicated their interest in 16 statements on a scale from 1 (*very uninteresting*) to 6 (*very interesting*). Immediately afterwards, they completed the *truth rating phase*. Instructions warned that some statements appeared earlier in the experiment, while others were new. Half of the participants learned that the experimenter would randomly choose one answer and assign a \$1 bonus if it was correct (*incentive condition*); the other half received no monetary incentive (*standard condition*). Participants rated the truthfulness of 32 statements using a binary scale

(*true, false*). Next, they completed the *cognitive reflection test* (see Table 2). Participants answered seven questions (e.g., *If you're running a race and you pass the person in second place, what place are you in?*) that have intuitive, but incorrect, answers (e.g., *first place*). As a manipulation check, participants answered the question *Was a bonus possible during this study?*

Table 2

Cognitive Reflection Test

Question	Intuitive Answer	Correct Answer
The ages of Mark and Adam add up to 28 years total. Mark is 20 years older than Adam. How many years old is Adam?	8	4
If it takes 10 seconds for 10 printers to print out 10 pages of paper, how many seconds will it take 50 printers to print out 50 pages of paper?	50	10
On a loaf of bread, there is a patch of mold. Every day, the patch doubles in size. If it takes 40 days for the patch to cover the entire loaf of bread, how many days would it take for the patch to cover half of the loaf of bread?	20	39
If you're running a race and you pass the person in second place, what place are you in?	first	second
A farmer had 15 sheep and all but 8 died. How many are left?	7	8
Emily's father has three daughters. The first two are named April and May. What is the third daughter's name?	June	Emily
How many cubic feet of dirt are there in a hole that is 3' deep x 3' wide x 3' long?	27	0

Note. We took items from Shenhav, Rand, and Greene (2012) and Thomson and Oppenheimer (2014).

Results

The alpha level was set at .05 for all statistical tests. First, we confirmed that participants in the incentive condition understood our instructions – in both studies, more than 98% of participants correctly reported that a bonus was possible during the study.

We conducted a 2 (condition: incentive, standard) x 2 (repetition: repeated, new) mixed ANOVA on the proportion of claims judged to be “true.” The relevant data appear in Figures 1 and 2. Replicating the classic illusory truth effect, repeated statements (Experiment 1: $M = 0.77$; Experiment 2: $M = 0.77$) were judged “true” more often than new ones (Experiment 1: $M = 0.49$, $F(1, 600) = 530.08$, $p < .001$, $\eta_p^2 = .47$; Experiment 2: $M = 0.62$, $F(1, 584) = 178.49$, $p < .001$, $\eta_p^2 = .23$). The presence or absence of an incentive interacted with repetition in Experiment 1 ($F(1, 600) = 6.76$, $p = .010$, $\eta_p^2 = .01$), but not Experiment 2 ($F < 1$). Participants with monetary incentives for accuracy still exhibited illusory truth (Experiment 1: repeated $M = 0.76$, new $M = 0.52$, $t(303) = 14.61$, $p < .001$, $d = 0.83$; Experiment 2: repeated $M = 0.76$, new $M = 0.62$, $t(294) = 9.28$, $p < .001$, $d = 0.54$). The illusion was stronger among participants in the standard condition in Experiment 1 (repeated $M = 0.77$, new $M = 0.47$, $t(297) = 17.91$, $p < .001$, $d = 1.04$), but not Experiment 2 (repeated $M = 0.77$, new $M = 0.61$, $t(290) = 9.61$, $p < .001$, $d = 0.56$).

Figure 1. Proportion of statements rated “true” as a function of condition and repetition in Experiment 1. Error bars reflect standard error of the mean.

Figure 2. Proportion of statements rated “true” as a function of condition and repetition in Experiment 2. Error bars reflect standard error of the mean.

In an exploratory analysis of the incentive condition, we found no correlation between illusory truth and correct answers on the cognitive reflection test in Experiment 1, $r = 0.08$, $p = .185$. Surprisingly, more reflective participants showed a *larger* illusory truth effect in Experiment 2, $r = 0.29$, $p < .001$. Analytic thinkers were no better at disengaging from a fluency heuristic.

General Discussion

People fall for falsehoods that feel easy to process, even when correct answers could earn them money. In two experiments, illusory truth occurred when we offered monetary rewards for accuracy. Repetition misled participants even when they received a reminder alongside every item during the truth rating phase. This finding complements the observation that offering

rewards for accurate judgments does not necessarily reduce biases, from false consensus (Mullen, 1983) to the representativeness heuristic (Tversky & Kahneman, 1972).

Fluency powerfully influences many judgments (see Alter et al., 2009, for a review), and people learn from experience that repetition correlates with truth (Unkelbach, 2007).

Probabilistically, we encounter the one true version of a fact (e.g., *Roosevelt served four terms*) more often than any of the infinite possible falsifications (e.g., *Eisenhower served four terms*, *Reagan served four terms*, *Wilson served four terms*). As a result, it is difficult to disengage participants from this heuristic – illusory truth emerges after strong warnings, for claims coming from untrustworthy sources, and despite contradictory advice (Brashier & Marsh, 2020). Our results suggest that people also continue to infer truth from fluency when we raise the stakes.

More generally, motivation may exert a smaller influence on our truth judgments than we expect. As another example, politically motivated beliefs do not reduce illusory truth. Repeating news headlines inflates belief, regardless of whether the content fits with participants' ideology (Pennycook et al., 2018). At the extreme, Murray and colleagues (under review) exposed participants to statements made by Donald Trump (e.g., *California admitted there were a million illegal votes in the 2016 presidential election*). These quotes seemed truer than new ones later, even for participant who identified as Democrats. Similarly, while we might intuit that partisanship leaves us vulnerable to fake news, the culprit is often 'lazy thinking' (see Pennycook & Rand, 2021, for a review); analytic thinkers are better able to discern true from fake news, even when headlines align with their politics (Pennycook & Rand, 2019).

We also sometimes fail to consider *others'* incentives when discriminating truths from lies. People struggle to detect deception, with an accuracy rate barely better than chance (54%; see Bond & DePaulo, 2006, for a meta-analysis). Part of the problem is that people mistakenly

believe that liars exhibit nonverbal ‘tells,’ like averting their gaze (see Hartwig & Bond, 2011, for a meta-analysis). Listeners rely on these nondiagnostic cues even when they receive more predictive information, like details revealing whether or not the speaker had an incentive to lie (Bond et al., 2013). Like our own experiments, this incentive structure only involved possible rewards (gaining 15 minutes of free time for misrepresenting one’s actual opinions).

What if people stood to *lose* time or money instead? Introducing a *cost* for wrong answers might reduce illusory truth, as punishment can impact behavior more than rewards do (Kubaneck et al., 2015). On the other hand, people may weather losses because fluency facilitates fast, easy truth judgments. Relying on a ‘shortcut’ makes sense in many contexts, but can lead us astray in a post-truth world where misinformation is often repeated (Brashier & Marsh, 2020). Even a single previous exposure to fake news headlines inflates belief (Pennycook et al., 2018), and our results suggest that repetition holds persuasive power even when the stakes are high.

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