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Truth by Repetition: Explanations and Implications

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Abstract

People believe repeated information more than novel information; they show a repetition-induced truth effect. In a world of "alternative facts," "fake news," and strategic information management, understanding this effect is highly important. We first review explanations of the effect based on frequency, recognition, familiarity, and coherent references. On the basis of the latter explanation, we discuss the relations of these explanations. We then discuss implications of truth by repetition for the maintenance of false beliefs and ways to change potentially harmful false beliefs (e.g., "Vaccination causes autism"), illustrating that the truth-by-repetition phenomenon not only is of theoretical interest but also has immediate practical relevance.

Keywords

truth effect, repetition, fake news, alternative facts, belief formation, referential theory, familiarity, fluency

> It was Napoleon, I believe, who said that there is only one figure in rhetoric of serious importance, namely, repetition. The thing affirmed comes by repetition to fix itself in the mind in such a way that it is accepted in the end as a demonstrated truth.
>
> Gustave Le Bon (1895/1996, Chapter 3.2)

Judging the truth of information is one of the most important tasks people face every day. Subjectively true information influences opinions (e.g., "Do vaccinations cause autism?"), judgments (e.g., "I do not believe that vaccinations cause autism"), and choices (e.g., "I will vaccinate my child"). In a world of "alternative facts" and "fake news," it is paramount to understand the psychological processes by which people come to believe information. Here, we discuss one of the most robust influences on subjective truth: repetition. People believe repeated information more than novel information, a phenomenon called the *repetition-induced truth effect*.

The following describes the effect and its psychological explanations with an emphasis on recent theoretical and empirical developments. We close with potential implications of truth by repetition for an information environment in which people are exposed to repeated but potentially harmful false information.

The Repetition-Induced Truth Effect

In a typical experiment, individuals read or hear information once in a presentation phase (e.g., "The highest tree in the world is a spruce"). After some delay, they complete an evaluation phase, in which they judge the truth of the presented information. Importantly, participants evaluate repeated information from the presentation phase and novel information. People typically evaluate repeated information as more true compared with novel information, and if information is also evaluated during presentation, truth evaluations increase because of repetition for a given information item. The change in subjective truth is captured by rating scales or binary true/false choices. For example, Hasher, Goldstein, and Toppino (1977) asked participants to evaluate statements on a 7-point scale (1 = *definitely false*, 2 = *probably false*, 3 = *possibly false*, 4 = *uncertain*, 5 =

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possibly true, 6 = *probably true*, and 7 = *definitely true*). Begg, Anas, and Farinacci (1992, Experiment 1) used the same scale with reversed labels (i.e., 7 = *definitely false*). Unkelbach and Greifeneder (2018) used a sliding scale from –50 (*surely false*) to +50 (*surely true*), and Unkelbach (2007) used forced binary decisions (*true* or *false*).

Across these different measures, the standardized effect is medium sized: A quantitative meta-analysis by Dechêne, Stahl, Hansen, and Wänke (2010) revealed a fixed-effect size (*d*) of 0.53 (95% confidence interval = [0.47, 0.58]) for verbatim repeated information compared with novel information. And the effect is robust against specific variations in design and measurement (see Dechêne et al., 2010, for an extensive discussion of potential moderators).

The effect appears with information ranging from trivia ("The thigh bone is the longest bone in the human body"; Hasher et al., 1977) to consumer opinions ("Billabong shampoo leaves hair shiny with no residue"; Johar & Roggeveen, 2007) to false news items ("Donald Trump sends his own plane to transport 200 stranded marines"; Pennycook, Cannon, & Rand, 2018). It is present with repetition intervals from minutes (Brown & Nix, 1996) to weeks (Garcia-Marques, Silva, Reber, & Unkelbach, 2015) to months (Schwartz, 1982). It occurs even when people are explicitly warned about its nature (Nadarevic & Aßfalg, 2017), when people have knowledge regarding the statements (Fazio, Brashier, Payne, & Marsh, 2015), when people are motivated to arrive at accurate evaluations (Garcia-Marques, Silva, & Mello, 2016), and when explicit advice regarding factual truth is present during judgment (Unkelbach & Greifeneder, 2018). So why do people believe repeated information?

Explanations

Logically, mere repetition should not increase subjective truth. The tendency to believe repeated information more than nonrepeated information was already ridiculed by Wittgenstein in his *Philosophical Investigations* (1955/1977). One may not use repetition to ascertain truth, as that would be equivalent to buying "several copies of the morning paper to ensure that the content is true" (Wittgenstein, 1955/1977, p. 147). However, there are several psychological explanations for why people may judge repeated information as being truer than nonrepeated information.

Frequency

Hasher and colleagues (1977) provided the seminal experimental evidence for truth by repetition, and they devised the basic paradigm described above. Participants first read statements and then evaluated the truth of repeated and novel statements. Indeed, they believed repeated information more than novel information. The authors reasoned that higher frequency of occurrence confers higher validity to repeated compared with novel trivia statements.

Recognition

Bacon (1979) then showed that subjective recognition rather than objective frequency increases subjective truth. In his experiments, participants believed repeated statements more only when they recognized them as being repeated, but not when they judged factually repeated statements as being new.

Familiarity

Building on the idea of recognition experience, Arkes, Hackett, and Boehm (1989) suggested that people may judge repeated information as more true because it *feels* more familiar compared to novel information. Begg et al. (1992) directly tested the different contributions of feelings of familiarity and explicit recollection. Their participants evaluated trivia statements from honest and lying sources. If participants could recollect the source of the statements in the evaluation phase, truth judgments should depend on the source credibility (i.e., honest or lying). As predicted, though, participants judged repeated statements from "lying" sources as more true than novel statements, yet less true than statements from "honest" sources. Thus, the authors argued that familiarity and recollection independently contribute to subjective truth.

Processing fluency

Reber and Schwarz (1999) then argued that processing fluency may underlie the familiarity explanation. Processing fluency is the subjective ease of ongoing conceptual or perceptual processes and influences many judgments and decisions (Unkelbach & Greifeneder, 2013); for example, participants should judge "*The thigh bone is the longest bone in the human body*" as being less true because the letter font is more difficult to read. The authors manipulated processing fluency perceptually (i.e., without repetition) by using high-contrast and middle-contrast statements. They found that participants rated easy-to-read statements as relatively more true than difficult-to-read statements. The fluency explanation received further support from studies showing other nonrepetition-based fluency effects on judged truth (e.g., rhyming; McGlone & Tofighbakhsh, 2000) or that the

truth effect can be reversed by changing the interpretation of fluency experiences (e.g., "fluent processing" means "false"; Unkelbach, 2006, 2007).

Coherent references

Unkelbach and Rom (2017) provided a referential theory to explain the repetition-induced truth effect, which assumes coherent references as the causal construct. The theory first assumes that on reading information, information activates references in memory that correspond with the presented information and thereby provides understanding of the statements' elements. For example, people need memory references for what a thigh is and what a bone is to understand the thigh-bone statement. Second, the coherence of the corresponding memory references influences subjective truth. The statement "The thigh bone is the longest bone in the human body" is coherent because the human body has bones, it has thighs, and bones may differ in length. In contrast, the statement "The gross domestic product of Bolivia is $10" is incoherent; people understand the statement, but "$10" is incompatible with the memory reference for a nation's gross domestic product and thus is judged as false. Subjective truth is then a function of the number of corresponding references and their coherence. As this theory is rather novel, we delineate it in more detail.

Figure 1 illustrates how the theory explains repetition-induced truth effects: Incoming information activates corresponding references in memory, illustrated by the light gray lines. The left panel shows that some of the references are coherently linked (e.g., "wife" and "man"), whereas others are not (e.g., "jail" and "Malaya"). Understanding the statement then instigates the statement's corresponding memory references, which then consolidate into a referential network (middle panel). The right panel shows the evaluation phase. Because typical experiments use rather unknown information, repeated statements will have more coherent corresponding references than new statements, which is equivalent to comparing the left and right panels of Figure 1. Thus, repeated statements appear to be more true compared with novel statements, and truth by repetition follows.

Unkelbach and Rom (2017) tested several of the theory's predictions. For example, they showed that repetition-induced truth depends on the number of references; according to the theory, adding any reference should increase subjective truth. Thus, they compared a few-references condition (i.e., participants judged whether statements appeared on the right or left side of the computer screen) with a standard condition (i.e., participants read statements) and a many-references condition (i.e., participants thought about how the statements related to themselves). Accordingly, the difference between old compared with new statements was highest in the many-references condition, intermediate in the standard condition, and very small and not statistically different from zero in the few-references condition.

In addition, Unkelbach and Rom (2017) showed that participants make fluent "false" responses. If people read the statement "Falstaff was the last opera of Verdi" during presentation and later "Othello was the last opera of Verdi" during evaluation, they processed the later statement relatively fluently, as indicated by response latencies. Yet the latter statement is incompatible with the existing referential network, and participants judged such statements (i.e., Othello instead of Falstaff) as relatively more false, although either statement may be true: Primacy does not confer veracity.

The referential theory also explains why people believe information when it is fluent, familiar, or recognized. Previous explanations required benevolent learning environments (Unkelbach, 2007) or explicit lay theories about the meaning of fluency or familiarity (see Reber & Unkelbach, 2010; Schwarz, 2010). Here, the experiences from previous exposure correlate constantly with indicators of truth, namely corresponding references and their coherence. Thus, people may indeed learn fluency as a cue for truth (Unkelbach & Greifeneder, 2013) because the constructs are instigated by the same underlying referential network.

Relations among the explanations

All explanatory constructs are closely related and may be dissociated or integrated. For example, by showing that fluency influences subjective truth without repetition, one may dissociate recognition and fluency effects (Reber & Schwarz, 1999). Conversely, by framing processing fluency as an outcome of memory networks of coherent corresponding references (see Betsch & Glöckner, 2010; Kunda & Thagard, 1996; Unkelbach & Rom, 2017), one may integrate the explanations of related processing fluency, feelings of familiarity, recognition likelihood, and subjective frequency. Accordingly, Figure 2 suggests three theoretical pathways for repetition-induced truth effects. First, the effect may be caused independently by the interrelated influences of fluency, familiarity, recognition, and frequency, as well as the assumed referential network. Second, fluency, familiarity, recognition, and frequency may be mediating variables between an underlying referential network and observed effects. Third, these paths jointly lead to repetition-induced truth.

With these pathways, one may delineate different explanations for observed repetition-induced truth

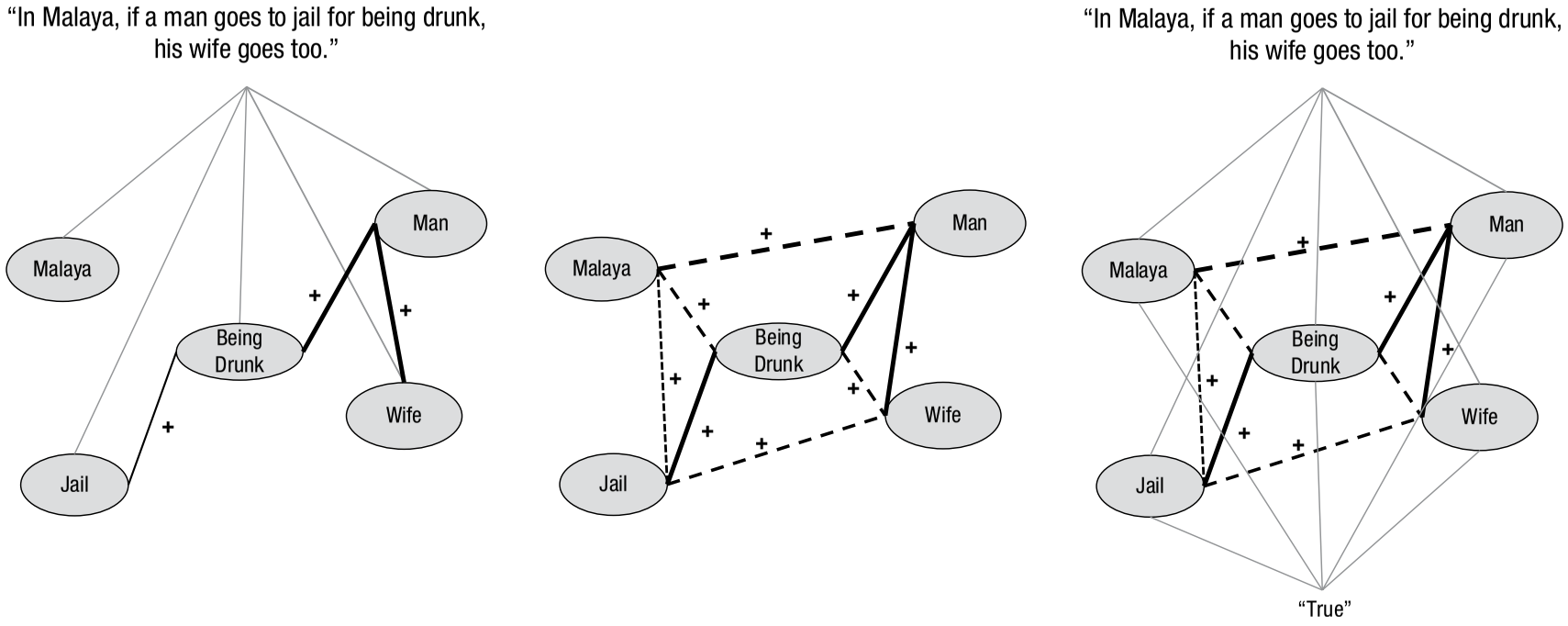

Fig. 1. Repetition-induced truth as explained by Unkelbach and Rom (2017). The light gray lines indicate incoming information (here, the statement) and outgoing information (here, the judgment). Corresponding references in memory give meaning to the elements in the incoming information, and the links between the references determine whether the resulting information networks are coherent or incoherent. Thick black lines indicate references that are linked, and dotted lines indicate references that are not a priori linked but are instigated by the presented information. Plus signs indicate an excitatory link, and minus signs an inhibitory link, with line and sign size indicating link strength. Following Kunda and Thagard (1996), we depict the process as a propositional, symbolic network. The left panel shows that part of the statement activates an existing localized network ("man"–"wife"–"being drunk") and also activates the reference "Malaya." The middle panel shows the formation of an information network during the delay. At test, the full localized network already exists, leading to a "true" judgment if a statement is repeated. New statements at test are equivalent to the initial presentation shown in the left panel. Because the novel statements (i.e., left panel) have fewer corresponding references linked in a coherent fashion compared with the repeated statements (i.e., right panel), a truth-by-repetition phenomenon follows.

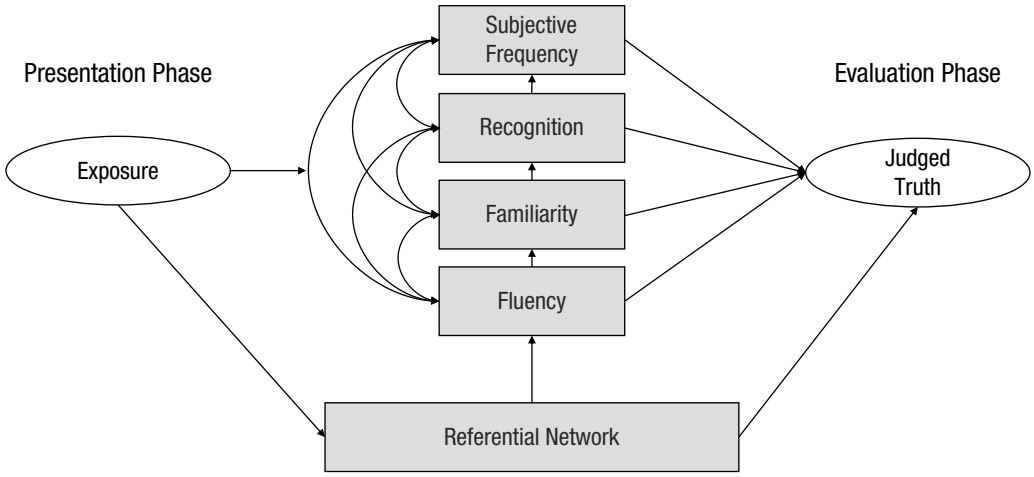

Fig. 2. Different mental processes that may increase subjective truth from exposure. The schematic illustrates that prior exposure influences these mental constructs but that the proposed referential network influences these variables as well.

effects. For example, Garcia-Marques and colleagues (2015) had participants read verbatim repeated statements and statements that contradicted statements from the presentation phase (e.g., "Crocodiles sleep with their eyes open"; "Crocodiles sleep with their eyes closed"). When participants evaluated these contradictory statements within the same experimental session, the statements received the lowest truth ratings. However, 1 week later, participants evaluated the contradictory statements as more true than novel statements. Interpreted within the referential theory, this effect appears because within the same session, the contradictory statements are incompatible with the established referential network. One week later, though, participants may have lost some of the incompatible references, but the imperfect yet coherent remains of the network now lead to higher judged truth compared with novel statements. Alternatively, one may assume that recognition caused the effect within the same experimental session but processing fluency or familiarity caused the effect 1 week later.

Similarly, in experiments by Silva, Garcia-Marques, and Reber (2017), participants judged verbatim repeated statements, paraphrases, contradictory statements, contradictory paraphrases, and novel statements. When participants evaluated statements within the same session, they judged both verbatim repetitions and paraphrases to be more true than new statements, while they judged contradictory statements and contradictory paraphrases to be less true than new statements. However, when participants judged the five statement types after 1 week, they evaluated contradictory statements and contradictory paraphrases as being as true as new statements. Again, these results may follow from a referential network or from joint recognition and fluency pathways.

Thus, the precise relations among the explanations are currently an open empirical question, and as suggested, there are promising ways to dissociate these influences on judged truth. For example, Silva, Garcia-Marques, and Mello (2016) used a learning paradigm based on Unkelbach (2007) and found that the repetition–truth association is stronger and less malleable than for fluency manipulations without repetition such as color contrast. Thus, as shown in Figure 2, fluency may influence judged truth, but there may be an independent and stronger influence that does not build on processing fluency. Alternatively, Unkelbach and Stahl (2009) used multinomial processing-tree models to dissociate the influences of knowledge, statement recollection, and fluency and also found independent influences of these factors on judged truth. These data are in line with the assumption that the truth-by-repetition phenomenon may have more than a single underlying cause.

Implications

No matter which mental processes may underlie the repetition-induced truth effect, on a functional level, repetition increases subjective truth. The effect's robustness may be worrisome if one considers that information nowadays is not randomly but strategically repeated. For example, the phenomenon of the "filter bubble" (Pariser, 2011) suggests that people get verbatim and paraphrased repetition only of what they already know and believe. As discussed, logically, this should not strengthen information's subjective truth. However, as discussed above, repetition does influence

subjective truth psychologically. In combination with phenomena such as selective exposure (e.g., Frey, 1986), confirmation biases (e.g., Nickerson, 1998), or failures to consider the opposite (e.g., Schul, Mayo, & Burnstein, 2004), it becomes apparent how even blatantly false information may come "to fix itself in the mind in such a way that it is accepted in the end as a demonstrated truth" (Le Bon, 1895/1996). For example, within the frame of a referential theory, filter bubbles repeat information and thereby add supporting coherent references for existing belief networks, which makes them difficult to change once they are established. Simultaneously, people should also process such information more fluently. In the studies reviewed here, statement content was mostly trivia. Yet, even for this trivia, participants evaluated contradictory information as being less true compared with novel information, even when they were explicitly told that it was 100% false (Unkelbach & Greifeneder, 2018). If one considers how many corresponding references the information that "vaccination leads to autism" may instigate for parents who must decide whether to vaccinate or not, the relevance of the truth-by-repetition phenomenon becomes apparent.

The presented explanations may also inform possible interventions to change false beliefs. For example, all accounts converge in the recommendation that negating false beliefs is a problematic strategy (e.g., "Vaccination does not lead to autism"). From a fluency perspective, this will also increase the processing fluency of the false information (i.e., "vaccination–autism"). In addition, from a referential perspective, the incoherence with existing networks will immediately devalue any presented counterevidence. Rather, one may address other information that implies references in the targeted network, such as information that vaccinations are frequent whereas autism is a rare disorder. The informational inconsistency of "rare" versus "frequent" should reduce the subjective truth that is associated with such referential networks without increasing processing fluency or reinforcing the referential networks of the false beliefs. Similarly, counterevidence should not take the form of negated information (see Mayo, Schul, & Burnstein, 2004) but should come in the form of novel information that should ideally instigate novel networks or build and add to existing ones (e.g., "Infectious diseases are at an all-time low for children").

With such theory-derived interventions, psychological science may contribute to changing likely false and potentially harmful beliefs that are frequently repeated (see Cook & Lewandowsky, 2011). Beyond these practical implications, the presented theoretical considerations show that there are still many novel and testable predictions for repetition-induced truth, which makes this 40-year-old phenomenon a highly promising research field for the future.

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