EFFECTS OF NONPROBATIVE INFORMATION ON JUDGMENTS OF KNOWLEDGE

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Effects of Nonprobative Information on Judgments of Knowledge

Abstract

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Claims are more likely to be judged true when accompanied by information that, though related to the subject of the claim, is actually nonprobative. This finding, coined the truthiness effect, is thought to occur because the embellished claims are processed more fluently, and therefore seem more accurate, than the unembellished claims. Five experiments are reported that explore the explanations for this effect. After an initial replication using nonprobative images, two experiments diminish truthiness via manipulations designed to mitigate the use of fluency as a cue for determining truth value of the claims: first by slowing presentation rate of the stimuli and then by warning participants of the nonprobative nature of the accompanying images. The concluding two experiments test alternative accounts of the truthiness effect. In Experiment 4, truthiness was not observed when claims were presented in a forced-choice format, supporting the hypothesis that a shift in response criteria underlies the effect in the standard true-false format. Experiment 5 was conducted to determine if truthiness is better conceptualized as increased positive responding to embellished claims or diminished positive responding to unembellished claims. A full design was used in which presence of nonprobative information was manipulated between subjects for some participants and within subjects for others. Though results were equivocal, available evidence best aligns with an inhibition account of truthiness, in which participants adopt a more conservative criterion.
for statements without nonprobative information when other statements have such information.
Effects of Nonprobative Information on Judgments of Knowledge

Suppose you are asked to rate a series of trivia statements as true or false. The statements pertain to somewhat difficult, rather obscure knowledge. For some statements, you are certain in your knowledge of the subject matter. Perhaps you are a fan of 1950s American television programs and are able to respond “true” with utmost confidence to the statement “Clarabell was the name of the clown on the ‘Howdy Doody’ television show.” You also know for certain that the statement “Beaumont was the actor who portrayed the father in the television show ‘Father Knows Best’” is false. However, your vintage TV-show viewing came at a cost to your knowledge of 19th century Russian literature: When presented with the claim “Dostoyevsky is the author who wrote ‘Brothers Karamazov’” you are not sure of the answer, even though you are expected to respond to this statement. In the absence of knowledge, what influences your response?

There are a number of factors that could potentially influence your decision. For example, you might deliberately search the statement for context clues and rate it as true, figuring that both the author’s name and the title of the book sound Russian. However, there are other influences on judgments of truth that do not involve effortful recollection or reasoning. This is the topic of the present study: A person sees a statement and has a particular psychological reaction to it. Under what circumstances will the person attribute the statement to their preexisting knowledge base?

Role of Attribution in Psychology

The conferral of truth has been shown, at least in part, to be an attributional process. One heuristic that can be used to judge truth value is familiarity. The feeling of
familiarity can be a plausible basis on which to decide a claim is true; a statement may seem familiar because it is in your preexisting knowledge base as a fact. However, sometimes a feeling of familiarity occurs for other reasons, though you may still attribute that feeling of familiarity to the statement’s existence in your knowledge base. For example, if the statement is accompanied by nonprobative information, you may be more inclined to regard that statement as true. Information is nonprobative if it is related to the subject of the statement, but does not actually give any indication that the statement is true or false. To use the example from the previous paragraph, imagine that the statement “Dostoyevsky is the author who wrote ‘Brothers Karamazov’” is accompanied by an image of cover art depicting the eponymous brothers. Although this image does not indicate the author of the work, it may indeed influence your response. This is the topic of the present study. A person sees a statement and has a particular psychological reaction to it. Under what circumstances will the person attribute the presence of the statement to their preexisting knowledge base?

The importance of attribution in mental life has long been a theme of psychology. Attribution can be defined as the attempts of people “to understand the causes and implications of the events they witness” (Ross, 1977). Heider (1944, 1958) initiated the effort in social psychology to study the attributions that observers make about other people. It is this notion that underlies the fundamental attribution error, the overemphasis placed on dispositional factors rather than situational factors when explaining the behavior of others (Ross, 1977), the classic demonstration of which was conducted by Jones and Harris (1967). A number of psychologists have pointed out that not only do we not have access to the mental lives of others; we may indeed only have incomplete
access to our own mental lives. Judgments made about ourselves are not necessarily based on direct access to the contents of our minds. In their seminal research on cognitive dissonance, Festinger and Carlsmith (1959) found that, in the absence of sufficient external justification, participants changed judgments of their own mental states to better align with a behavior they performed that contradicted their original beliefs. Schachter and Singer (1962) proposed that emotion, rather than being directly experienced, follows an attributional process in which a physiological state of arousal is interpreted as a particular emotion based on available cues.

**Role of Attribution in Cognition**

The idea of attribution has been taken from social psychology and been applied to cognitive psychology, where cognition has been viewed as an attributional process. Just as we do not necessarily have direct access to our emotions and beliefs, we often do not have direct access to the contents of our cognitive systems; therefore, we must make attributions. Judgments of the contents of our cognitive systems are often based on these attributions. Under this framework, memory can be viewed as an attributional process. When we encounter a stimulus and have a particular psychological response to it, we have to decide whether our response was caused by some property of that stimulus or by our previous history with that stimulus. The subjective experience of remembering is not the retrieval of a memory trace; rather, to remember is to attribute a response to the past (Jacoby, Kelley, & Dywan, 1989). The subjective feeling of familiarity upon encountering a stimulus will be experienced as remembering if that feeling is attributed to previous experience with that stimulus. If the feeling of familiarity is attributed to a
source other than previous experience with the stimulus, that feeling will not be experienced as remembering.

The importance of attribution in memory research is demonstrated in the increased emphasis placed on familiarity—rather than overt recollection—in recognition memory seen in both dual-process (Mandler, 1980) and global matching models of recognition memory such as SAM (Raaijmakers & Shiffrin, 1981) and MINERVA2 (Hintzman, 1988). Item recognition tasks have long been used to study episodic memory in an experimental context, and investigations into the mechanism underlying responses suggested that test takers rely upon feelings of familiarity when judging a test item as one previously presented (Mandler, 1980). When participants make recognition judgments, they are not necessarily recollecting specific experiences of encountering those items on the study list. Rather, they may base their decisions on whether or not the words feel “fresh” in mind since the studied items should be more recently activated in memory than the nonstudied items. Mandler’s (1980) dual-process model includes familiarity (along with retrieval) as one of two processes that work separately but additively to inform recognition judgments. In global matching models, rather than being one of two processes, familiarity is the primary index upon which recognition is made: The contents of memory are accessed globally, and the recognition judgment is made based on how familiar the test item is compared to these contents (Clark & Gronlund, 1996).

The idea that familiarity could be independent of recollection led to an interest in the effects of repetition priming on measures of recognition. Previous exposure to stimuli improves performance on tasks that measure memory implicitly without necessarily
influencing performance on tasks that measure memory explicitly (Jacoby & Dallas, 1981; Jacoby & Witherspoon, 1982; Tulving, Schacter, & Stark, 1982). Jacoby and Dallas (1981) demonstrated such a dissociation: in the absence of recognition memory, previously shown words were better identified during brief presentation than novel words. Similarly, Tulving, Schacter, and Stark (1982) revealed a benefit of prior exposure to words for performance on a word fragment completion task when recognition memory for the previously exposed words was not present. Priming effects for implicit memory tasks have been observed even in people with amnesia, a population whose recognition memory is severely impaired (Jacoby & Witherspoon, 1982). Explicit recollection of a word is not the only basis of recognition memory, but rather the sense that a word feels familiar, a seeming perceptual clarity, can serve as a basis for recognition judgments.

Jacoby and Dallas (1981) were interested in an implication of familiarity’s importance to recognition memory: If familiarity can be a basis for recognition memory such that repeated words seem more perceptually clear, would altering the actual perceptual clarity of the words in turn have an effect on recognition memory judgments? Their hypothesis was confirmed when words that were easier to perceive were more likely to be recognized (falsely or not) on a memory test, leading the researchers to posit that ease of perceptual processing serves as a cue for making recognition memory judgments (Jacoby & Dallas, 1981). An interest in investigating perceptual fluency followed this discovery. Witherspoon and Allan (1985), providing experimental evidence to support phenomenological observations from Jacoby and Dallas (1981), demonstrated that participants judge previously exposed words as being on screen for a
longer duration than novel words. Whittlesea, Jacoby, and Girard (1990) showed that judgments of perceptual clarity were influenced by repetition priming and demonstrated that, while perceptual clarity can affect judgments of recognition memory, awareness of the clarity manipulation rendered judgments of recognition unaffected by the increased perceptual fluency. In this discounting condition, participants were able to attribute fluent processing to perceptual clarity, thus not relying on it as a cue for the memory task; familiarity is not a characteristic of fluency, but rather familiarity arises when fluency is attributed to previous exposure (Whittlesea et al., 1990). Johnston, Hawley, and Elliott (1991) supported this notion by demonstrating that perceptual fluency is a cue for making recognition memory judgments but posited an inverse relationship between reliance on fluency as a cue and the availability of explicit memory. This conceptualization of the role of familiarity differs from earlier work on familiarity in recognition. In Mandler’s (1980) dual-process theory, familiarity is a characteristic of experience with a memory trace. In contrast, the feeling of familiarity in fluency is part of an attributional process that does not necessarily derive from the activation of a memory trace, but can also occur when fluency is mistakenly attributed to a past remembrance rather than a present ease in processing (Whittlesea et al., 1990).

**Role of Attributions in Judgments of Truth**

The role of attributions of fluency in cognition has now been studied in a variety of tasks (for a review, see Alter & Oppenheimer, 2009). Further examinations revealed that fluency need not be perceptual but can also be conceptual. In studies of conceptual fluency, rather than manipulation of the perceptual qualities of the stimuli, it is their more abstract qualities that are manipulated. For example, presenting test items as the final
words in predictive sentences increases item recognition judgments relative to neutral sentences (Whittlesea & Williams, 2001). Fluency has also been found to influence judgments aside from those of episodic knowledge, such as judgments of liking (Whittlesea & Price, 2001) and generic knowledge (Jacoby, Kelley, Brown, & Jasechko, 1989; Begg, Robertson, Gruppuso, Anas, & Needham, 1996; Begg, Anas, & Farinacci, 1992). It had been known that repetition increases judgments of generic knowledge, but now those effects can be understood under the umbrella of fluency manipulations that increase feelings of familiarity. In the false fame effect (Jacoby et al., 1989), repeated names are judged more famous than nonrepeated names; the fluency that comes with reading a repeated nonfamous name is mistaken as familiarity with that name owing to its fame status. In the illusory knowledge effect, repeated general knowledge facts are more likely to be judged as previously known (Begg et al., 1996; Westerman & Greene, 1999); the fluency that is actually caused by rereading a fact in the experimental context is mistaken as experience with the fact prior to the experiment.

Notably, much research has been conducted on the illusory truth effect (sometimes known simply as the truth effect), the finding that repeated little-known trivia statements are given higher subjective truth ratings compared to statements that are not repeated (Hasher, Goldstein, & Toppino, 1977; Bacon, 1979; Begg et al., 1992; for a review and meta-analysis see Dechêne, Stahl, Hansen, & Wänke, 2010). The illusory truth effect is now believed to be a result of the increased fluency for repeated statements, rather than a result of the repetition itself. Repetition of the statements functions to enhance fluency, making repeated statements seem more familiar, which in turn is attributed to the repeated statements’ truth. A sense of familiarity would normally occur
when a person retrieves a memory trace, thus the sense of familiarity can be used as evidence for the event having been previously encountered (Whittlesea et al., 1990). This relationship between familiarity and previous experience serves us well in many situations, except when feelings of familiarity are induced by reasons other than cueing of a memory trace, as is the case in experimental manipulations of fluency. Bacon (1979) argued that the perception of repetition, rather than the actual repetition itself, is responsible for the illusory truth effect. It has also been demonstrated that manipulating fluency can give rise to an illusion of repetition (Whittlesea, 1993). Begg, Anas, and Farinacci (1992) showed that source recollection and familiarity operate independently of one another, and that the illusory truth effect occurs because people attribute truth to statements that seem familiar.

In addition to repeating claims, a variety of other treatments aimed at manipulating fluency have been shown to affect confidence and truth judgments of general knowledge. General knowledge questions whose target answers have been primed are given higher feeling of knowing judgments (confidence in being able to recognize the correct answer) (Schwartz & Metcalfe, 1992). Free responses given to general knowledge questions whose target answers have been primed are given higher confidence ratings (Kelley & Lindsay, 1993). General knowledge claims whose target answers have been primed are given higher truth judgments (Bernstein, 2005). Semantic manipulations of statements, such as rhyme (the rhyme-as-reason effect) (McGlone & Tofighbakhsh, 2000) and concreteness of language (Hansen & Wänke, 2010), also lead to higher subjective truth judgments. The revelation effect, typically used to study recognition memory, has been extended to study general knowledge: unscrambling
anagrams of target answers leads to higher truth judgments (Bernstein, Whittlesea, & Loftus, 2002). Perceptual manipulations influencing fluency have also been shown to impact subjective truth judgments: general knowledge claims that are easier to read are more likely to be judged as true (Reber & Schwarz, 1999).

The Truthiness Effect

Recently, it has been demonstrated that presenting related information along with a claim leads to higher ratings of truth, even when the information itself does not actually provide any evidence for evaluating the veracity of the claim. This finding, termed the “truthiness effect”\(^1\) has been demonstrated both with visual nonprobative information (Newman, Garry, Bernstein, Kantner, & Lindsay, 2012; Fenn, Newman, Pezdek, & Garry, 2013; Newman et al., 2015) and semantic nonprobative information (Newman et al., 2012; Newman et al., 2014). The increase in subjective truth judgments has been demonstrated for statements of general knowledge (Newman et al., 2012; Fenn et al., 2013; Newman et al., 2014; Newman et al., 2015) as well as celebrity alive or dead judgments (Newman et al., 2012). The truthiness effect has also been found for general knowledge claims when attributed to sources with names that are easier to pronounce as compared to names that are more difficult to pronounce (Newman et al., 2014). In addition to a truthiness effect, a “falsiness” effect has been demonstrated in which

\(^1\) The term “truthiness” is appropriated from comedian Stephan Colbert who, speaking as his political pundit alter ego on *The Colbert Report*, used it to satirize appeals to emotions and gut feelings (rather than intellect) in political discourse.
unrelated information decreases subjective truth judgments of claims relative to related nonprobative information (Newman et al., 2015).

**Theoretical Explanations of the Truthiness Effect**

The truthiness effect has been proposed in the context of a fluency framework. That is, Newman et al. (2012) assumed that the presence of nonprobative information increases fluency in the processing of statements and this enhanced fluency results in a greater number of positive responses. However, this explanation has received little direct test. Several predictions of this fluency explanation are tested in this project. One prediction derives from the assumption that fluency is a rapid process most likely to influence performance when participants are not slowly deliberating their responses (Dewhurst & Anderson, 1999; Greene, 2004; Hirshman, Henthorn, Arndt, & Passannante, 2002; Hirshman & Henzler, 1998). Giving participants more time to respond to each item by using a slower presentation rate could reduce reliance on fluency. A second prediction derives from the importance of attributional processes in fluency phenomena: If participants are explicitly instructed to discount fluency, truthiness should be diminished.

Aside from fluency, other explanations of the truthiness effect may still be viable. One explanation is a response-criterion account. When participants mentally weigh evidence to decide whether particular statements are true or false, their responses will not only be influenced by the amount and nature of evidence, but also by the response criterion that they employ on particular trials: How much evidence will be required before a response of “true” is selected? It is possible that the presence of nonprobative
information, rather than change the nature of the evidence that participants retrieve, alters the response criterion that participants set. Participants may require less reason to respond “true” in the presence of nonprobative information than in its absence. If this account is correct, a truthiness effect should not be found when participants are tested in situations where response criteria are not used.

One more alternative explanation for the truthiness effect suggests that this phenomenon has been misinterpreted all along: The presence of nonprobative information does not increase the probability of making a positive response but rather its absence decreases the probability of making a positive response. It is possible that in a session where some statements are accompanied by nonprobative information, statements that are not accompanied by such information are perceived as less likely to be true than they would be in other contexts. In this account of the truthiness effect, the manipulation of nonprobative information is decreasing positive responses in the control condition rather than enhancing positive responses in the experimental condition. This can be tested by including a between-subjects comparison in which some participants receive only statements accompanied by nonprobative information and other participants receive only statements lacking nonprobative information.

Research Questions

Although a large body of literature exists on the factors influencing subjective truth, as well as the factors influencing fluency, the truthiness effect itself is a recent discovery and there is a relatively small literature concerning it. A better understanding of the effect would be beneficial not only to the pursuit of scientific knowledge, but also
when considering various applications of truthiness. As it is currently portrayed, the
truthiness effect is the increase in belief in general knowledge claims in the presence of
nonprobative information. However, there are explanations aside from an increase in
believability that could explain the higher subjective truth judgments given to the claims
presented with nonprobative information. For example, an alternative account of the
truthiness effect is that of a shifted response criterion, in which participants use different
criteria for judging the statements paired with nonprobative information and those
without it. Alternatively, it is also possible that the presence of nonprobative information
does not increase belief in the embellished claims, but rather it is the absence of
nonprobative information that decreases belief in the unembellished claims. Methods
that have been used thus far to investigate the truthiness effect are not able to rule out
these competing explanations.

This study addresses the following research questions:

1. Can the truthiness effect be replicated?
   Replication of the original effect is a standard stage of research before attempting
   new manipulations. However, replication of the truthiness effect is important in
   itself because the effect is newly discovered, and work regarding it has been
   published largely by the same researchers.

2. Can manipulating presentation rate eliminate the truthiness effect?
   If fluency at least in part underpins the truthiness effect, slowing presentation rate
   may reduce or eliminate any differences in truth judgments made in the
   nonprobative image and no image conditions. By giving participants more time
to respond, they may rely less on fluency as a cue to inform their judgments of truth and instead have the opportunity to make responses based on recollection.

3. Can manipulating instructions eliminate the truthiness effect?

It is possible that informing participants about the nonprobative nature of the information will enable them to disregard its presence as a cue when making judgments of truth.

4. Can a criterion shift account for the truthiness effect?

Subjective truth has been measured thus far almost exclusively using binary true-false tasks. The true-false task assumes the establishment of a criterion against which the truth of statements is judged. It is possible that participants use different criteria for judging claims paired with nonprobative information versus claims presented without nonprobative information, causing higher truth judgments for the embellished claims. A forced choice task, in which participants are shown pairs of statements and select one true statement from each pair, is assumed to remove such criteria. If claims presented with nonprobative information are given higher subjective truth ratings in a forced choice task, the criterion-shift explanation for the truthiness effect could be ruled out.

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2 The only exception to date has been one experiment in which participants rated the truth of statements (that in reality were all false) on a 9-point scale (Newman, et al., 2015; experiment 4). The truthiness effect was found using this rating scale. The rating scale task is similar to the true-false task in that each statement is rated individually, differing mainly in the size of the response set. Rather than one criterion, multiple criteria are assumed to operate in the rating task (Macmillan & Creelman, 2005). This rating method, like the binary true-false method, is not able to rule out a criterion-shift account.
5. Can inhibition of positive responses to unaccompanied claims account for the truthiness effect?

Although the truthiness effect has been framed as the increased belief in claims accompanied by nonprobative information, it is possible that the difference in truth judgments between the accompanied and unaccompanied claims is actually caused by a decrease in the credibility of the claims that are not presented with nonprobative information. To determine whether the truthiness effect is a result of the inhibition of truth judgments in the absence of nonprobative information, an experiment is needed that compares truth judgments made when the presence of nonprobative information is manipulated within subjects to truth judgments made when the presence of nonprobative information is manipulated between subjects. If the inhibition account is correct, the statements presented without nonprobative information in the within-subjects design would lead to lower judgments of truth than either condition in the between-subjects design. Although the presence of nonprobative information has been manipulated in experiments using within-subjects designs and in experiments using between-subjects designs (Newman, et al., 2015), an experiment using the full design has not, to the author’s knowledge, been published.

The same general method was employed for Experiments 1-3, with Experiment 2 introducing a change in presentation rate and Experiment 3 a change in instructions, relative to Experiment 1. Experiment 4 changed the nature of the test, and Experiment 5 compared the within-subjects design used in Experiment 1 with a between-subjects design.
Experiment 1: Replication

Method

**Participants.** Forty-nine Case Western Reserve University students enrolled in introductory psychology classes participated in partial fulfillment of course requirements.

**Design.** A within-subjects design was used with the presence of nonprobative image (present or not present) and truth status of the statements (true or false) as the manipulated variables. Positive responses (endorsement of a statement as true) were analyzed.

**Materials.** One hundred fifty-two true-false general knowledge statements were generated based on the updated Nelson and Narens (1980) normed list (Tauber, Dunlosky, Rawson, Rhodes, & Sitzman, 2013). In an attempt to obtain the truthiness effect, only difficult questions were used (probability of recall ranging from .083 to .000). Low probability of recall increases the chances that participants will be uncertain of the truth status of the statements. If a participant is certain of an answer (for example, that “Marseille is the capital of France” is false), the presence or absence of a nonprobative image (such as the French flag) is not expected to negate a strongly held notion (that Paris is the capital of France). However, when objective knowledge is not available to them, people rely on other cues to make truth judgments (Alter & Oppenheimer, 2009). The absence of objective knowledge enables nonprobative information to affect truth judgments.

The Tauber et al. (2013) free response questions were rephrased as statements, half of which were true and half of which were false. True statements were created by
inserting the correct response into the statement. For example, the original question, “What is the last name of the man who wrote ‘Canterbury Tales’?” was rewritten as “Chaucer wrote ‘Canterbury Tales.’” False questions were created by inserting a plausible foil into the statement: “What is the name of the ship on which Charles Darwin made his scientific voyage?” was rewritten as “Basset was the name of the ship on which Charles Darwin made his scientific voyage.” (Beagle is the correct answer.) Questions were then arranged in a fully randomized order to create the test list. Images were selected that depicted the subject of the statements without providing any diagnostic information regarding the truth value of the statement. The example statements outlined above were accompanied by a depiction of a scene from an illustrated version of *Canterbury Tales* and by a drawing of the vessel from an illustrated edition of *The Voyage of the Beagle*, respectively. Half of all claims were accompanied by a nonprobative image while the other half of the claims appeared unaccompanied, creating four question conditions: true statement with nonprobative information, true statement without nonprobative information, false statement with nonprobative information, and false statement without nonprobative information (*n* = 38 in each condition). Two sets of images were used: statements shown with nonprobative images to one group of participants were the statements shown without images to the other group. Participants were given numbered response sheets where they circled true or false for each statement. Four practice statements were also created, one for each question condition.

**Procedure.** Participants were tested in groups. Statements were projected, one at a time, onto a screen. They remained on screen for 5 seconds, enough time for participants to read the statement, make a quick truth judgment, and record a response.
Participants were instructed to provide a true or false response for every statement, guessing if necessary. They were told that some statements would be shown with pictures and that some would not be shown with pictures, but that their task was to provide a true or false judgment for both types. Participants were not given any further instructions regarding the images.

**Results**

Separate analyses were conducted on positive responses (statements endorsed as true) and accuracy (number of positive responses to true statements and number of negative responses to false statements). All tests used a .05 criterion of statistical significance.

**Positive responses.** A repeated-measures ANOVA was conducted to investigate the impact of nonprobative information condition (present, not present) and truth status of statement (true, false) on positive responses (endorsement of a statement as true). There was a significant main effect for presence of nonprobative information \(F(1, 48) = 9.47, \text{ partial eta squared} = .17\): Participants endorsed true responses more often when a statement was accompanied by nonprobative information \([M = 45.71, SD = 8.19]\) than when a statement appeared without nonprobative information \([M = 42.63, SD = 7.51]\). There was also a significant main effect of truth status of statement \(F(1, 48) = 17.76, \text{ partial eta squared} = .27\): Participants were more likely to positively endorse a true statement (hit) \([M = 46.22, SD = 6.64]\) than a false statement (false alarm) \([M = 42.12, SD = 8.84]\). The interaction between nonprobative information condition and truth status of statement was not statistically significant \(F(1, 48) = 0.22, \text{ partial eta squared} < .01\).
Support for the truthiness effect was found in that participants were more likely to endorse a positive response when a statement appeared with nonprobative information, regardless of the actual truth status of the statement.

**Accuracy.** Correct responses under the two different nonprobative information conditions (present or not present) were analyzed using a paired samples t-test. Presence of nonprobative information did not significantly influence accuracy \[ t(48) = 0.47, d = 0.07 \]: Correct responses were nearly identical between nonprobative information present \[ M = 40.24, SD = 5.02 \] and nonprobative information absent \[ M = 39.86, SD = 3.87 \] conditions.

**Experiment 2: Increased time**

There are numerous cues that can potentially be used when deciding whether or not a statement is true, one of which is the feeling of familiarity brought about by differences in fluency between statements paired with nonprobative information and those without additional information. The feeling of familiarity is a heuristic that can be used to make such judgments quickly, but can lead to erroneous judgments when familiarity arises for reasons other than retrieval of a memory trace. However, there are bases aside from feelings of familiarity on which memorial decisions can be made. When people have more time to gather other sorts of evidence via deliberative processes, the role of fluency in the decision making process is decreased (Dewhurst & Anderson, 1999; Greene, 2004; Hirshman et al., 2002; Hirshman & Henzler, 1998). If the truthiness effect depends on participants generating pseudoevidence because of a discrepancy in processing fluency between statements with and without nonprobative information as
suggested by Newman et al. (2015), then a manipulation that reduces the use of fluency as a cue and promotes the use of careful recollection as a cue should impede truthiness. With this aim in mind, the presentation rate of the statements was slowed for Experiment 2.

**Method**

**Participants.** Fifty-two Case Western Reserve University students enrolled in introductory psychology classes participated in partial fulfillment of course requirements.

**Design.** A within-subjects design was used with the presence of nonprobative image (present or not present) and truth status of statement (true or false) as the manipulated variables. Positive responses (endorsement of a statement as true) were the dependent variable.

**Materials.** The materials used in Experiment 2 were identical to those of Experiment 1.

**Procedure.** Rather than being on screen for 5 seconds each, statements were presented for 8 seconds. With the exception of a slower presentation rate and a lack of practice statements, the procedure for Experiment 2 was identical to the procedure for Experiment 1.

**Results**

Separate analyses were conducted on positive responses (statements endorsed as true) and accuracy. All tests used a .05 criterion of statistical significance.
Positive responses. A repeated measures ANOVA was conducted to investigate the impact of nonprobative information condition (present, not present) and truth status of statement (true, false) on positive responses (endorsement of a statement as true). The main effect of presence of nonprobative information was not statistically significant \[F (1, 51) = 0.91, \text{partial eta squared} = .02\]: Positive responses endorsed when statements appeared with nonprobative information \((M = 46.52, SD = 9.66)\) were nearly equivalent compared to when statements appeared without nonprobative information \((M = 45.42, SD = 7.66)\). There was a significant main effect of truth status of statements \[F (1, 51) = 38.21, \text{partial eta squared} = .43\]: Participants were more likely to positively endorse a true statement (hit) \((M = 49.50, SD = 8.05)\) than a false statement (false alarm) \((M = 42.44, SD = 9.31)\). The interaction between nonprobative information condition and truth status of statement was not statistically significant \[F (1, 51) = 1.84, \text{partial eta squared} = .04\]. Support for the truthiness effect was not found in that nonprobative information did not influence positive responses for either true or false statements. Because increased time for deliberating eliminated the truthiness effect, a fluency explanation is supported.

Accuracy. Correct responses under the two different nonprobative information conditions (present or not present) were analyzed using a paired samples t-test. Accuracy did not significantly differ between conditions \[t(51) = 1.38, d = .19\]: Correct responses were comparable in the nonprobative information present \((M = 42.10, SD = 5.12)\) and nonprobative information absent \((M = 40.94, SD = 5.08)\) conditions.

Experiment 3: Instructions to ignore nonprobative information
In Experiment 2, the truthiness effect was eliminated by giving participants more
time to respond, enabling them to rely on evidence other than fluency to make their
responses. It is also possible that the instructions given to participants could influence
the use of fluency as a cue to make truth judgments. In previous research on the
truthiness effect, participants were told about the nonprobative information but were
given no instructions regarding its purpose or how it should be used (Newman et al.,
2012; Fenn et al., 2013, Newman et al., 2015). When people are aware that the source of
their fluent processing is irrelevant, they are able to discount it when making judgments
(Whittlesea et al., 1990). For Experiment 3, additional instructions explicitly outlining
the nonprobative nature of the images were added to the procedure of Experiment 1.

Method

Participants. Fifty-six Case Western Reserve University students enrolled in
introductory psychology classes participated in partial fulfillment of course requirements.

Design. A within-subjects design was used with the presence of nonprobative
image (present or not present) and truth status of the statements (true or false) as the
manipulated variables. Positive responses (endorsement of a statement as true) were
analyzed.

Materials. The materials used in Experiment 3 were identical to those of
Experiment 1.

Procedure. The procedure for Experiment 3 was identical to that of Experiment
1 except with respect to instructions given to the participants. As in Experiment 1,
participants were informed of the presence of the images, but they were also advised that
the images were irrelevant to deciding whether a statement was true or false: “Sometimes statements will be shown with pictures, and sometimes they will not. The pictures are irrelevant. Your goal is to decide whether the statement is true or if it is false. The pictures will not help you determine this…Again, some of the statements will be shown with pictures, but you should focus on answering the question.”

Results

Separate analyses were conducted on positive responses (statements endorsed as true) and accuracy. All tests used a .05 criterion of statistical significance.

Positive responses. A repeated measures ANOVA was conducted to investigate the impact of nonprobative information condition (present, not present) and truth status of statement (true, false) on positive responses (endorsement of a statement as true). The main effect of presence of nonprobative information on positive responses was not statistically significant \(F(1, 55) = 0.70, \text{ partial eta squared} = .01\): Positive responses to statements presented with nonprobative information present \([M = 44.89, SD = 6.96]\) were nearly equivalent to positive responses endorsed to statements presented without nonprobative information \([M = 44.36, SD = 7.50]\). There was a significant main effect of truth status of the statements \([F(1, 55) = 30.65, \text{ partial eta squared} = .36]\) on positive responses: Participants were more likely to positively endorse a true statement (hit) \([M = 46.68, SD = 7.19]\) than a false statement (false alarm) \([M = 42.57, SD = 7.54]\). The interaction between nonprobative information condition and truth status of statement was not statistically significant \([F(1, 55) = 0.05, \text{ partial eta squared} < .01]\). Support for the truthiness effect was not found in that nonprobative information did not influence
positive responses for either true or false statements. Because instructions regarding the nonprobative nature of the images eliminated the truthiness effect, a fluency explanation is supported.

**Accuracy.** Correct responses under the two different nonprobative information conditions (present or not present) were analyzed using a paired samples t-test. Accuracy did not significantly differ based on presence of nonprobative information \( t(55) = 0.22, d = .07 \): Correct responses to statements presented with nonprobative information \( M = 40.09, SD = 3.91 \) were nearly identical to correct responses to statements presented without nonprobative information \( M = 39.91, SD = 4.21 \).

**Experiment 4: Forced-Choice Test**

Signal-detection theory (Wickens, 2002) assumes that two separable factors determine whether participants make a positive or negative response to any sort of test. One factor is the nature and amount of relevant information that participants have available on a given trial. The second factor is the decision rule, or criterion. Each participant must determine how much supporting evidence is required before a positive response is given on a particular trial. A liberal criterion will lead to more positive responses than a conservative criterion. When two conditions are compared on a test requiring a positive or negative response on each trial, it may be impossible to distinguish which of these two factors is responsible for differences between conditions (Witt, Taylor, Sugovic, & Wixted, 2015).

Previous investigations of the truthiness effect have used a binary true-false response format: Participants are presented with individual statements and asked to judge
each statement as either true or false. In these situations, it is assumed each individual establishes a decision rule as to how true a statement must seem to declare it true. A liberal decision rule, one that does not require much feeling of subjective truth to judge a statement as true, would lead the individual to make many positive responses. The use of a more conservative decision rule would have the opposite pattern, leading to fewer positive responses. The increase in subjective truth for statements that are presented with nonprobative information might occur because of an increase in the subjective ease of processing those statements. However, it is possible that the truthiness effect could be explained by a change in the criteria participants use when judging the claims in the presence of nonprobative information versus in its absence.

Unlike the true-false format, a forced choice format removes the criterion from the task (Greene, 2004; Murdock, 1982; Lockhart, 2000; Hicks & Marsh, 1998). Rather than judging the truth of each statement individually, a forced choice task requires the participant to select one item as true from pairs of statements. In this format, one statement must always be judged as the true statement. A criterion is not established because, rather than judge each statement individually against a criterion, the task is to select the statement of each pair that has the highest subjective truth value. The question changes from “Is this statement true or false?” to “Which of these statements is true?” The forced choice response format has not yet been used to investigate truthiness and would be useful in determining the role of the criterion in the effect. If truthiness is best explained by the generation of pseudoevidence for the statements shown with nonprobative information, a forced choice task should show the effect: Test-takers should select statements presented with nonprobative information as the true statement more
frequently than they select statements presented without information. However, if the
truthiness effect is the result of different criteria used to judge truth in the presence versus
absence of nonprobative information, then the forced choice design is expected to
eliminate this response bias and the effect would not be found: Test-takers would select
statements presented with nonprobative images at the same rate as statements presented
without nonprobative images.

Method

Participants. Fifty-two Case Western Reserve University students enrolled in
introductory psychology classes participated in partial fulfillment of course requirements.

Materials. The same statements and accompanying nonprobative information
from the previous studies were used. However, rather than appearing individually the
statements were presented in pairs, the statement on the left labeled “A” and the
statement on the right labeled “B.” Participants recorded their responses on paper by
circling A or B for each question.

Procedure. Statements were presented in 76 pairs. Participants were instructed
to select one statement as true from each pair. Each pair remained on screen for 10
seconds, giving participants enough time to read the two statements and record a truth
judgment. For each pair of statements, one was shown with a nonprobative image and
the other was shown without an image. The image appeared on the left side of the screen
on half of the trials and on the right for the other half. Half the time the true statement
was paired with a nonprobative image, and the other half of the time the false statement
was paired with the image. The position of the true and false statements was also
balanced across presentations. There were two sets of images: The statements presented with images for half of the participants were those presented without images for the other half of participants.

**Results**

**Nonprobative information selected.** The proportion of test pairs on which the item with nonprobative information was selected \([M = .50, SD = .09]\) did not exceed .50 \([t(51) = 0.351, p = .727, SEM = .01]\). Test-takers selected as true the statements presented with nonprobative images and statements presented without images at equal rates, demonstrating a complete lack of a truthiness effect and suggesting that a criterion shift underlies the truthiness effect when it is observed in true-false tasks.

**Accuracy.** Mean proportion of accurate responses \([M = .56, SD = .07]\) was higher than chance \([t(51) = 5.70, p < .001, SEM = .01]\). Because each test pair contained both an item with nonprobative information and one without such information, accuracy as a function of condition cannot be determined.

**Experiment 5: Comparison of Within- and Between-Subject Designs**

The complete elimination of the truthiness effect in the forced-choice test in Experiment 4 is consistent with a response-criterion account of the effect on binary tests. That is, when exposed to statements with and without nonprobative information, participants employ different response criteria in the two conditions. A more liberal criterion is used when nonprobative information is present than when it is absent. A forced-choice test, in which one fact in each condition is shown on each trial and no response criterion is required, would be expected to eliminate this effect if this account is
true. Still, at the moment, this response-criterion account is incomplete: On binary true-false tests where the truthiness effect is found, is this effect due to participants moving the response criterion in the condition with nonprobative information in a more liberal direction or is it due to participants moving the response criterion in the control condition in a more conservative direction?

The truthiness effect is often described as a biasing presence of nonprobative information on truth judgments in that nonprobative information makes claims seem more believable. However, it is possible that the reason for the bias is not because the presence of nonprobative information makes participants more likely to endorse those statements. Rather, perhaps the absence of nonprobative information leads participants to be skeptical of unembellished statements, causing them to shift their response criterion in a more conservative direction. Essentially, does the presence of nonprobative images increase positive responding or does the absence of nonprobative images decrease positive responding? Current evidence suggests that participants must be exposed to both image conditions to display truthiness: The effect is found only in within-subjects designs and has not been observed when presence of nonprobative information is manipulated between subjects (Newman et al., 2015). To appropriately compare results from within-subjects and between-subjects designs, a full design is needed in which participants are randomly assigned either to a condition in which the presence of nonprobative images is manipulated within subjects or to a condition in which it is manipulated between subjects. If the presence of nonprobative information makes statements more believable to test-takers compared to statements presented alone, the within-subjects image condition should lead to higher mean positive responses than either nonprobative image condition
(present or not present) in the between-subjects design. Alternatively, it is possible the unaccompanied statements in the within-subjects design would lead to fewer positive responses than either condition in the between-subjects design. This would point not to a “truthiness” effect *per se*, in which the presence of nonprobative information makes a statement seem more true, but rather to an inhibition effect, in which the presence of nonprobative information presented with some statements inhibits positive responding to statements that are not presented with the additional information, presumably by leading to a shift in the response criterion in a more conservative direction. In the case of inhibition, explanations of truthiness should not focus on why the embellished statements seem more true, but rather on why the unembellished statements seem less true.

**Method**

**Participants.** One hundred eight Case Western Reserve University students enrolled in introductory psychology classes participated in partial fulfillment of course requirements.

**Design.** The design was similar to that of Experiment 1. The within-subjects condition followed the method of Experiment 1 exactly, with presence of nonprobative information (present or not present) and truth status of the statements (true or false) manipulated within subjects. In the between-subjects condition, the presence of nonprobative information (present or not present) was manipulated between subjects and the truth status of the statements (true or false) was be manipulated within subjects. Positive responses (endorsement of a statement as true) were analyzed.
**Materials.** The within-subjects design used the same statements and accompanying nonprobative information as was used in Experiments 1-3. When nonprobative information was manipulated between subjects, the participants in the image condition were exposed to statements that were all presented with nonprobative images and the remaining participants were exposed to the statements without images.

**Procedure.** The procedure for the within-subjects design was identical to that of Experiment 1. The design which manipulated the presence of nonprobative images between subjects followed a similar procedure, but the instructions given to participants did not make mention of the presence or absence of the images.

**Results**

Initial analyses were conducted to determine the presence of the truthiness effect in the two different designs (nonprobative information manipulated within subjects and nonprobative information manipulated between subjects). Separate analyses were conducted on positive responses (statements endorsed as true) and accuracy for the within-subjects and between-subjects conditions. After initial analyses, proportion of positive responses was compared between the two designs. All tests used a .05 criterion of statistical significance.

**Positive responses.** ANOVAs were conducted on the data from the within-subjects and between-subjects designs to determine the effect of nonprobative information (present or not present) and truth status of statements (true or false) on positive responses (endorsement of a statement as true).
**Within-subjects design.** A repeated-measures ANOVA was conducted on the data from the within-subjects design. Positive responses did not differ significantly in the presence of nonprobative information \([M = 42.84]\) versus in the absence of nonprobative information \([M = 41.00]\), \([F(1, 47) = 2.82, p = .10, \text{partial eta squared} = .057]\). Positive responses differed based on truth status of statement, with test takers endorsing more true statements as true \([M = 45.04]\) than false statements \([M = 38.85]\), \([F(1, 47) = 28.05, p < .001, \text{partial eta squared} = .374]\). The interaction between presence of nonprobative information and truth status was not significant \([F(1, 47) = 0.14, p = .72]\).

**Between-subject design.** A mixed ANOVA was conducted on the data from the between-subjects design, with presence of nonprobative information as a between-subjects factor, truth status of claims as a within-subjects factor, and positive responses as a dependent variable. Positive responses did not differ significantly in the presence of nonprobative information \([M = 88.20]\) versus in the absence of nonprobative information \([M = 85.53]\), \([F(1, 58) = 0.53, p = .471, \text{partial eta squared} = .009]\). Positive responses differed based on truth status of statement, with test takers endorsing more true statements as true \([M = 46.02, SD = 8.02]\) than false statements \([M = 40.85, SD = 7.96]\), \([F(1, 58) = 28.78, p < .001, \text{partial eta squared} = .332]\). The interaction between presence of nonprobative information and truth status was not significant \([F(1,58) = .01, p = .918]\).

**Accuracy.** Correct responses under the two different nonprobative information conditions (present or not present) were analyzed using t-tests for the two different designs. Presence of nonprobative information did not influence correct responses in
either the within-subjects \([t(47) = 0.48, p = .620]\) or between-subjects \([t(58) = 0.16, p = .877]\) designs. In the within-subjects design, correct responses were similar between nonprobative information present \([M = 41.27, SD = 5.27]\) and nonprobative information absent \([M = 40.79, SD = 5.14]\) conditions. In the between-subjects design, correct responses were also quite similar in the nonprobative information present \([M = 80.97, SD = 8.07]\) and nonprobative information absent \([M = 81.27, SD = 6.89]\) conditions.

**Within- and between-subjects comparisons.** To compare positive responses across both designs, raw number of positive responses were converted to positive response rates (the proportion of positive responses out of the possible number of questions in that condition) (see Table 1 for mean response rates in each condition).

**Mean difference in positive responses.** When presence of image was manipulated within subjects, the difference in mean positive response rate was small (mean difference = .0250, 95% CI: -.0149 to .0548). Similarly, when presence of picture was manipulated between subjects the mean difference was also small (mean difference = .0175, 95% CI: -.0308 to .0659). The null hypothesis cannot safely be rejected in either design. Because the confidence intervals for the two designs overlap, it is not safe to conclude that one effect or another is larger.

**Within-subjects image and between-subjects no image.** One could argue that the critical test for an inhibition account of truthiness is comparing the rate of positive responses in the nonprobative image condition when presence of image is manipulated within subjects (within-subjects image condition) to the rate of positive responses in the no image condition when presence of image is manipulated between subjects (between-
subjects no image condition). If the presence of nonprobative information makes statements more believable, participants exposed to both image conditions should give higher truth ratings to statements with images than the participants who are exposed only to statements in the absence of images. Alternatively, if positive responses were equivalent in these two groups, results would better align with an inhibition account of truthiness. In Experiment 5, participants in the within-subjects image condition endorsed true responses at nearly an equivalent rate ($M = .5644$) as participants in the between-subjects no image condition ($M = .5627$) [$t(76) = 0.06, p > .05, SEM = .0266$]. Thus, though results from Experiment 5 are somewhat ambiguous, they are most consistent with an inhibition explanation of truthiness in which the statements appearing without images in the within-subjects design seem less plausible in comparison to the statements presented with nonprobative information.

**Discussion**

The five experiments presented here were undertaken to improve understanding of the mechanisms underpinning the truthiness effect. Truthiness describes the finding that participants are more likely to endorse a statement as true when it is presented with additional information that is nonprobative—information that is related to the subject of the statement but does not provide valid evidence for determining its truth. In Experiment 1, the truthiness effect was successfully replicated: Participants more frequently endorsed true responses to general knowledge statements that were presented with nonprobative images than statements that were presented without images. In Experiments 2 and 3, the truthiness effect was reduced: There was not a significant
difference in positive endorsements for statements presented with nonprobative information and those presented without it. This reduction of truthiness was accomplished via manipulations designed to mitigate the use of fluency as a cue for determining the truth of the claims. Experiments 4 and 5 tested explanations of the truthiness effect aside from fluency. By presenting claims in a forced-choice, rather than true-false, format, the results of Experiment 4 support a criterion-shift account; the truthiness effect was entirely eliminated in this forced-choice format where each test pair contained one claim with nonprobative information and one claim without such information. A full design was used in Experiment 5, allowing comparison across conditions when presence of nonprobative information was manipulated within subjects or between subjects. This procedure was undertaken to test an inhibition account of the truthiness effect, an account which the results can be interpreted as supporting (though not unequivocally). That is, the results of Experiment 5, when taken together with the findings of Experiment 4, suggest that the primary cause of truthiness effects is a conservative criterion shift for the control condition when participants are also exposed to statements with nonprobative information.

The results of Experiments 2 and 3 are what would be expected of a fluency explanation of the truthiness effect as presented by Newman et al. (2012). In the fluency account of truthiness, nonprobative information facilitates processing of the statements. The ease of processing the statements is attributed to previous experience with the statements rather than to the nonprobative information. The feelings of familiarity for the claims translates to higher subjective truth ratings. In Experiment 2, the truthiness effect was eliminated by slowing the presentation rate of the stimuli. The use of fluency as a
cue in determining truth is considered an automatic process (Whittlesea, 1993). Increased time to consider the truth of the statements affords participants more opportunity to engage in deliberative processing, enabling them to consider forms of evidence aside from the feelings of familiarity that arise from fluent processing. Though seeming to favor a fluency explanation of the truthiness effect, Newman et al. (2015) raise the possibility that participants could deliberately search the nonprobative images in a top-down manner for confirmatory evidence in support of the claims. Citing a think-aloud pilot procedure, Newman et al. (2015) note anecdotally that some participants were able to find fallacious support for the claims in the nonprobative information\(^3\). (They do not provide any anecdotes for participants judging the claims that were presented without nonprobative information.) In the present study, it was when participants were given more time for processing— and therefore more time to deliberately trawl the nonprobative information for confirmatory evidence— that the truthiness effect was eliminated. If a deliberate search of the nonprobative information for substantiation were primarily responsible for truthiness, one would not expect increased exposure to the information to diminish the effect.

In Experiment 3, the truthiness effect was again diminished, this time by warning participants that the images would not be useful for judging the truth of the statements. As expected from a fluency effect, truthiness was not found when participants were

\(^3\text{Newman et al. (2015) give the example of one participant who, when presented with the claim “Macadamia nuts are in the same evolutionary family as peaches” accompanied by an image of macadamias, reasoned that the claim seemed plausible since macadamia nuts and peaches look similar. Note that the same conclusion could be reached in the absence of the image.}\)
warned of the nonprobative nature of the images. Fluency is used as a cue signaling truth to the extent that the feelings of familiarity that arise from fluent processing are attributed to previous experience with the stimuli. Participants are able to discount fluency if they realize that its cause is not pertinent to making a truth judgment (Whittlesea et al., 1990; Whittlesea & Williams, 2001). If ease of processing is attributed to the presence of the images rather than to previous experience with the statements, participants are able to disregard the fluency associated with the images. In this situation, feelings of familiarity owing to the nonprobative information do not arise because fluent processing is not misattributed to previous exposure to the statements. If participants are warned that the images will not help them decide whether a statement is true or false, they are able to ignore any cues from the images when judging truth.

Experiment 4 used a forced-choice testing format to investigate a criterion-shift account of truthiness. Unlike true-false tasks, forced-choice tasks do not require the test-taker to set a criterion to judge truth (Greene, 2004; Hicks & Marsh, 1998; Lockhart, 2000; Murdock, 1982); rather than comparing the evidence for each item against a criterion, participants compare the strengths of the two alternatives against each other and choose the stronger item. In the criterion-shift account, truthiness occurs because test-takers change how much evidence (i.e., subjective feeling of truth) is required to consider a statement true in the presence of nonprobative information versus its absence. The claims presented with nonprobative information and those presented without it provide equivalent evidence, but there is a discrepancy in how the test-taker evaluates that evidence between the two conditions. The criterion-shift account is in contrast to explanations in which the nonprobative information functions to increase available truth.
evidence. If test-takers consider statements paired with nonprobative images to be more believable, they should endorse the embellished claims as true more frequently than the unembellished claims whether they are presented in a true-false format or in a forced-choice format. However, this was not the case: The rate at which participants selected as true the claim shown with an image was equivalent to the rate at which they selected the claim presented without an image. Because truthiness was not observed in Experiment 4 using a forced-choice task, the results are consistent with a criterion-shift explanation of the effect. This finding suggests that truthiness is observed in true-false tasks because of differences in how test-takers judge truth in the two conditions (nonprobative information present or not present). On true-false tests, participants are more liberal in the image condition and more conservative in the no image condition. When claims are shown with nonprobative images, test-takers may use a more liberal criterion in which they require less evidence to endorse a claim as true. Conversely, a more conservative decision rule biases the participant to judge a claim as false because a stronger sense of subjective truth is required to judge the claim as true.

Experiment 5 employed a full design to compare positive responses when presence of nonprobative images is manipulated within subjects to when it is manipulated between subjects. This design was undertaken to determine whether truthiness is better conceptualized as enhanced belief in statements presented with nonprobative information or diminished belief in statements presented without nonprobative information. Interpretation of the results from Experiment 5 is not straightforward because the presence of the truthiness effect in either design is unclear; even in the within-subjects comparison in Experiment 5, which was a straightforward replication of Experiment 1,
the truthiness effect approached, but did not reach, conventional levels of statistical
significance. However, the findings are perhaps best characterized as aligning with an
inhibition account of truthiness. If the presence of nonprobative information enhances
the credibility of claims, one would expect higher mean positive responses in the within-
subjects nonprobative image condition than when subjects are exposed only to claims in
the absence of images (the between-subjects no image condition). However, mean
positive responses were comparable between these conditions.

Though the data are somewhat ambiguous, the results presented here are most
consistent with the notion that truthiness occurs in the typical within-subjects, true-false
design because test-takers are excessively conservative when judging the truth of claims
presented without images. This conclusion is generally in line with that of Newman et al.
(2015), in which they discuss differences in response bias for between-subjects and
within-subjects designs, focusing on a more liberal criterion for the within-subjects image
condition. They speculate that test-takers’ liberal criteria for claims presented with
images might occur because they do not want to endorse too many negative responses
overall; thus, the claims presented without images are judged with a more neutral
criterion (Newman et al., 2015). The results of the current study could be interpreted as
generally supporting this notion, but would change the focus from an excessively liberal
criterion for claims presented images to an excessively conservative criterion for claims
presented without images. In any case, it seems that it is critical to consider test format
and study design when considering truthiness because the context in which nonprobative
information is presented influences how (or if) test-takers use nonprobative information
to evaluate the truth of claims. Indeed, one of the empirical conclusions of this study is
that the truthiness effect is quite fragile, as changes in presentation rate, instructions, test format, and design reduced the effect to statistical nonsignificance. Although the responses that people give may be influenced by the presence of nonprobative information, such an effect is limited in size and may be found only in rather narrow circumstances.

Further work on truthiness would be valuable. The effect has garnered attention in the popular media, receiving mention on The Colbert Report. Recently, the truthiness effect has been extended beyond truth judgments of generic knowledge to truth judgments of episodic memory (Cardwell, Henkel, Garry, Newman, & Foster, 2016) and to belief in positive claims about the future (Newman, Azad, Lindsay, & Garry, 2016). One can imagine numerous situations in which truthiness would be a biasing effect to be avoided or a useful tool to be cultivated. Despite its brief history, practical considerations regarding the truthiness effect have been published relating to law, business, education, and health communication: Should the legal field be concerned about the influence of nonprobative images on jurors during trials (Kellerman, 2013; Newman & Feigenson, 2013)? Does placing nonprobative images on product labels influence consumer evaluations of those goods (Mantonakis, Cardwell, Beckett, Newman, & Garry, 2014)? Should educators use nonprobative images in their instructional materials, such as lecture slides (Napper, 2014; Reber & Greifeneder, 2016)? Will nonprobative information aid or hinder attempts to communicate health information to the public (Schwarz, Newman, & Leach, 2016)?
Considering the interest that has been expressed in translating and applying the truthiness effect, the equivocal results of the current study, and the relatively small corpus of literature investigating the mechanisms underpinning truthiness, future studies are warranted. The results reported here do provide several straightforward tactics to foster and to combat truthiness. That truthiness can be influenced in rather simple ways should inform how we view its practical applications. Additionally, the limitations and boundary conditions of the truthiness effect outlined here, as well as in previous work, can serve to provide us with some solace. The influence nonprobative information has over our better judgment is neither inevitable nor absolute. Though conferral of truth can be swayed by the presence of decorative embellishments, knowledge is power: Awareness of the nonprobative nature of ornamental information or taking the time to consider the contents of one’s own knowledge base can eliminate truthiness.
Mean Percent Positive Responses (SD) by Condition in Experiment 5

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*Table 1*
References


