JOURNAL OF CONSUMER PSYCHOLOGY, *12*(2), 81–91

Perceived Source Variability Versus Familiarity: Testing Competing Explanations for the Truth Effect

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This article tests 2 competing explanations for the truth effect, the finding that repeated statements are believed more than new statements. Previous research has put forth 2 explanations for this effect—subjective familiarity and perceived source variability. The subjective familiarity explanation holds that repeated statements feel more familiar and are therefore believed more than new statements. This explanation has received strong support in the literature. The source variability explanation holds that people attribute repeated statements to different sources; this belief, that multiple sources endorse the statement, increases belief in repeated statements relative to new statements attributed to a single source. However, previous studies testing this explanation have confounded source variability with source credibility. This research aims to tease apart the effects of subjective familiarity and source variability while holding source credibility constant across conditions. Results of the first 2 experiments manipulating number of sources and measuring recognition implicate subjective familiarity rather than perceived source variability as the mechanism underlying the truth effect. However, the third study demonstrates that source variability does enhance belief in repeated statements that are initially perceived as low in plausibility. Theoretical and practical implications are discussed.

You are flipping through a magazine and see an ad for *Take Control*, a spread made from natural soybean extract. The ad says "*Take Control* tastes great and helps promote healthy cholesterol levels!" Do you believe it? What if you then see a picture of Regis Philbin with his testimonial "Sounds too good to be true? Wait 'til you try it. It's delicious and helps me look after my cholesterol!" —will his testimonial increase your belief?

Without product experience, you may be forced to depend on cues (such as how familiar the claim feels or how many people you know support the claim) to judge the veracity of product claims. If you repeatedly hear "*Take Control* tastes great and helps promote healthy cholesterol levels." the claim will feel familiar to you. This familiarity increases your belief in the claim (Hawkins & Hoch, 1992). This finding, that repeated exposure to ambiguous statements (statements that could be judged as either true or false) increases the rated truth of these statements compared to a single exposure, is known as the "truth effect" (Arkes, Boehm, & Xu, 1991; Arkes, Hackett, & Boehm, 1989; Bacon 1979; Gigerenzer, 1984; Hasher, Goldstein, & Toppino 1977; Schwartz 1982).

But what happens when you hear others making product testimonials? It seems reasonable to assume that if you hear the statement from different people on each exposure, the more likely you are to believe that the statement is true. So if you hear the *Take Control* claim from Regis once and Rosie once will you believe it more than if you just hear the claim from Regis both times? And if you cannot recollect the source but you recognize seeing the claim multiple times, will you attribute different exposures to different sources and hence increase your belief in the claim? This is the intuition behind the notion of source variability.

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This article explores the possibility that the truth effect can be explained by peoples' perceptions that they have heard the repeated statement before and their attribution of the previous exposure to a source other than the one currently relating the claim. Thus, perceiving that previous exposure was from a different source could enhance people's belief in the repeated statement. Specifically, this article tests competing explanations for the truth effect. Is the truth effect due to subjective familiarity or is it due to perceived source variability?

LITERATURE REVIEW

The truth effect is the finding that repeated statements are believed more than new statements. It appears to be generalizable across many conditions. It occurs for statements about general topics (Hasher et al., 1977), trivia statements (Bacon, 1979), opinion statements (Arkes et al., 1989), and product related claims (Hawkins & Hoch, 1992; Law, Hawkins, & Craik, 1998). It works for statements that are repeated minutes apart (Schwartz, 1982), and statements that are repeated weeks apart (Hasher et al.). It works for both verbal statements (Hasher et al.) and written statements (Schwartz). It works when the statement is in the context of all repeated statements (Schwartz), and when it is interspersed among new statements (Hasher et al.). It works when the participant is asked to rate the validity after each repetition (Hasher et al.), and when the participant is only asked to rate the validity after the final repetition (Schwartz). It even works when the participant is told that the statement is repeated (Bacon). In general though, the largest increase in rated truth–value occurs after the first repetition (Arkes et al., 1991). In addition, to judging repeated statements as more true, people are also likely to rate statements that are judged to contradict statements that they have previously heard as more false (Bacon). The most important criterion of these statements is that they are ambiguous; otherwise the veracity of the claim can be judged independent of exposure.

How and Why Does the Truth Effect Occur?

The truth effect is a curious phenomenon. Frequency, recognition, and familiarity have all been found to mediate the effect. In addition, variables such as processing task and involvement have been investigated as moderators of the effect. These mediating and moderating effects are discussed in the following.

Mediators of the truth effect. Hasher et al. (1977) were the first to suggest that repetition of plausible statements increased a person's belief in those statements. Although participants were able to discriminate between true and false statements by assigning higher validity ratings to statements that were true than those that were false, the increase in validity ratings with repetition was equivalent for true and false statements. Because there was no way for the participants to verify the truth or falsity of the given statements, the authors concluded that frequency (the number of times the statement was shown) "must have served as a criterion of certitude for our subjects" (p. 112).

Bacon (1979) was not convinced that frequency was the mediating variable for the truth effect. In his experiment he aimed to tease apart several different explanations for the effect, and found support for the recognition explanation. He concluded that the participant's judgment of the statement as being old or new was the critical factor mediating the truth effect—not the actual repetition status of the statement. Further, he found that actually recognizing the statements as repeated did not nullify the effect. Participants still rated those statements they recognized as being repeats as more true on the second (vs. first) exposure.

Bacon's (1979) explanation of recognition as the mediating variable for the truth effect served until Hawkins and Hoch (1992) presented a more general account for the phenomenon: the familiarity account. The familiarity account suggests that repetition increases familiarity with the semantic content in the statement. This familiarity then serves as a cue to the truth of the statement independent from the ability to recognize or "detect" a repetition. The familiarity account is more general than the recognition account. With the recognition explanation the participant must explicitly form a recognition–detection judgment before assessing validity. With the familiarity explanation the repetition primes the general topic area, creating a sense of familiarity. This familiarity then increases the participant's belief in the statement and subsequently their truth rating.

In this manner the truth effect is closely related to the mere exposure effect. The mere exposure effect states that the more frequently an initially unobjectionable stimulus is encountered the more people grow to like it (Kunst-Wilson & Zajonc, 1980; Zajonc 1968). This is true even when the subject can only recognize the stimulus at a level approximating guessing. Just as the increase in truth ratings is mediated by familiarity, the affective preference for the stimuli is mediated by familiarity (Mandler 1980).

Moderators of the truth effect. In their investigation of the truth effect, Hawkins and Hoch (1992) demonstrated that processing task and involvement moderate the truth effect. In one of their experiments they put participants in one of three processing task conditions: a rote rehearsal task, an analysis condition where participants were asked to identify specific letters in the statements, and a comprehension task. Their results showed that the processing task had a large influence on familiarity. Specifically they found that rote rehearsal produced a larger truth effect than the comprehension

or orthographic processing tasks. Furthermore, whereas the truth effect in the rote rehearsal and comprehension tasks was significant, the truth effect in the orthographic condition was not. Thus, they concluded that there must be a "minimum level of processing that must occur for the truth effect to take place" (p. 222).

Hawkins and Hoch (1992) also tested whether level of involvement would impact the truth effect. They placed half the participants in a high involvement condition (rating the truth of each item on the first exposure) and half in a low involvement condition (rating how easy or difficult the statement was to understand on the first exposure). Results revealed that statements read under high-involvement led to better recognition performance, but that statements read under low-involvement led to a larger truth effect.

The role of mediating variables such as frequency, recognition, and familiarity, and moderating variables such as processing task and level of involvement, have been clearly documented. Source variability, however, still appears to need further investigation. This article aims to contrast the role of multiple source attributions with that of familiarity in explaining the truth effect. Before addressing specific hypotheses, the next section of this article explores the literature in relation to source variability.

Source Variability

Bacon (1979) was the first to touch on the source variability explanation. His manipulation of source attribution (participants were informed vs. not informed that the source was session one of the experiment) was quite strong. He had two experimental groups, a group that was informed that the statements were repeated and a group that was uninformed. He found that despite knowledge of the repetition, the truth effect still occurred. However, the mean truth ratings for repeated and new statements were slightly diluted in the source informed group. It appears that cuing the information is repeated (from a single, less credible source) does reduce the truth effect slightly.

Arkes et al. (1989) were the first to specifically test for the effect of source variability. If multiple source attributions are the sole mechanism that underlie enhanced belief in repeated statements, then the truth effect should not occur when statements are attributed to a single source. Arkes et al. (1989) asked participants to rate the validity of statements in the first session and in the second session. After rating the validity of each statement, the participant was next asked to read through the statements again and determine if they had heard the statement before that session. They found that statements thought to have been seen before outside of the experiment were given significantly higher ratings than those thought to have been seen before in the experiment, which were in turn given higher ratings than those thought never to have been seen before. Thus they concluded that when source variability occurred, the truth effect was significantly greater; however it was not a necessary condition for the effect to occur. In this experiment, source variability was a measured rather than manipulated variable and could also be confounded with source credibility (i.e., the experimental exposure may have been perceived as less credible).

In a follow up paper on the effects of source variability, Arkes et al. (1991) used a powerful name–fame manipulation where either famous people (e.g., John Wayne) or nonfamous people (e.g., William Dolin) were the topic of the sentence. The sentences were presented in two sessions. In each session, after each sentence, the participant was asked to rate the validity, familiarity, and source attribution. In the second session there was an additional category for source attribution: previous experimental session. Using a structural equation model, Arkes et al. (1991) found that source dissociation and familiarity both had causal effects on validity. They found that sentences with famous people as the topic were much more likely to be attributed to sources outside the experiment, and to be rated as more familiar and hence, as more true. Source dissociation had a direct impact on validity ratings in addition to this indirect effect via familiarity. Although they manipulated the source, it is a very strong manipulation and includes the familiarity (i.e., sentences containing names of famous people are more familiar) confound.

Because of this shortcoming, Boehm (1994) tested for the effect of source variability without including the famous name manipulation. Instead he measured source recognition through a multiple choice question where participants indicated if and where they had heard the statement before. In his first experiment, he did not find any effect of source recognition. In the second experiment, he found that although source variability did occur, it was not a necessary condition for the truth effect to occur. Again, he used a measure of source variation, and credibility was a potential confound. He concluded that source variability was not directly related to validity ratings. He added, in agreement with Arkes et al. (1991), that "although source dissociation does not appear to be a necessary condition for the validity effect, it may affect familiarity and may therefore have an indirect influence on validity" (p. 291).

Begg, Anas, and Farinacci (1992) examined the effect of credibility of sources on the truth effect. They found that repeated statements from a credible source were given higher truth ratings than repeated statements from a noncredible source, and that repeated statements from a noncredible source were given higher ratings than new statements. They concluded that familiarity and source recognition contributed to the truth effect when the source was credible. Source credibility appears to boost the effects of repetition; however the basic truth effect occurs even when the source is noncredible. However, this study cannot answer the question of perceived number of sources because source attributions were not measured.

Law et al. (1998) examined the impact of age-related deficits on recognition and source memory. They found that the elderly were more likely than the young to attribute statements to an outside source, even when their source–memory scores were corrected for recognition performance (source attributions were only examined if the statement was correctly recognized as old/new). Consequently, the elderly were more susceptible to repetition-induced enhancements in belief. Additionally, they found that having participants generate a mental image of the claim during the first session, eliminated age differences in source memory (as well as eliminating age-related differences in the truth effect). Their results support the notion of source variability–credibility as a mechanism underlying the truth effect, but again their experiment measured, rather than manipulated, source credibility. Further, the paper was concerned with the effects of source credibility (in vs. outside experiment source perceived) rather than source variability (perceived number of sources).

This article extends previous research by simultaneously examining the roles that multiple source attributions and recognition play in the truth effect. Based on prior research, statements recognized as old should be rated more true than statements perceived as new (the basic familiarity effect). However, the role of source variability is not as clear. If source variability rather than credibility drove the results of previous research on source effects, then repeated statements attributed to different sources should be rated even truer than those attributed to a single source. However, if source credibility drove prior results, then multiple (equally credible) sources being associated with the statement at different times should not enhance the basic familiarity-induced truth effect. Finally, it is possible that the basic familiarity explanation will not hold when people realize that the same source is repeating the statement (although this is less likely given the replication of the truth effect even when participants know the statement was repeated in the experiment). This is the logic underlying the first two experiments reported in the following sections.

EXPERIMENT 1

In this first study we manipulate the number of sources and repetition, while holding credibility constant, to examine the effect of multiple source attributions on perceived validity. Based on the reasoning previously stated, repetition is expected to enhance validity ratings via the familiarity of the statement. In addition, if source variability underlies the truth effect, then number of sources should interact with repetition such that the basic repetition effect is enhanced when the statement is associated with multiple sources rather than a single one. Finally, if the basic assumption underlying the source variability explanation, namely that attributing a claim to more than one source increases belief in the claim, is true, then number of sources should have a main effect on validity (independent of repetition).

Method

The basic experimental procedure was common to experiments reported here and was similar to previous truth effect studies. Participants were shown fictitious consumer testimonials about "Australian products" during two different sessions. Some of the statements were shown in either the first or second session. Others were repeated in both sessions. Some of the testimonials were attributed to one person. Others were attributed to two people.

Participants and design. Participants were 80 undergraduate and graduate students who were paid $15 each for their participation. The basic design was a 2 × 2 within-subjects design. Item type (old: 2 exposures vs. new: 1 exposure) and number of sources (one vs. two names associated with the claim on each exposure) were repeated factors. These manipulations are further explained later.

Stimuli. Forty consumer testimonials about 10 different product categories were created. For each product category, four fictitious products were created (e.g., for personal care items the four products were Vanity toothpaste, Billabong shampoo, Zokki soap, and Truly mouthwash). The product names were loosely based on names of actual Australian products. However, none of the fictitious product names matched with a corresponding product in Australia.

Using these fictitious products, consumer testimonials were created (one for each product). The testimonials were intended to be ambiguous in truth–value such that participants would have no reason to believe the claim to be true or false based on the testimonial presented. A customer name was attributed to each testimonial. For example, a participant would read: "Billabong shampoo leaves hair shiny with no residue."—Claudia Green.

The names attributed to the testimonials were created by looking through the phone book for common last names. Last names were considered common if there was a column of people with that last name. A common female first name was then assigned to each last name, resulting in a total of 80 different names. Each claim had two names associated with it. For example, some participants would read the Billabong shampoo claim made by Claudia Green, some would read the Billabong shampoo claim made by Phyllis Evans, and others would read the Billabong shampoo claim made by Claudia Green and Phyllis Evans. The claim read was exactly the same for all participants; the only difference was who made the claim. Fictitious names were used to hold the credibility of sources constant.

TABLE 1
Experiment One Stimuli Formations

Time	Claim Condition		Set 1	2	3	4	5	6	7	8
1		Claim:	A	C	B	D	A	C	B	D
		Source:	1	1	1	1	2	2	2	2
		Claim:	B	D	A	C	B	D	A	C
		Source:	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2
2	a) 2 exposures	Claim:	A	C	B	D	A	C	B	D
	1 source	Source:	1	1	1	1	2	2	2	2
	b) 2 exposures	Claim:	B	D	A	C	B	D	A	C
	2 sources	Source:	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2
	c) 1 exposure	Claim:	C	A	C	B	D	B	D	A
	1 source	Source:	1	1	2	2	1	1	2	2
	d) 1 exposure	Claim:	D	B	D	A	C	A	C	B
	2 sources	Source:	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2

Procedure. Eight sets were created to counterbalance the source associations of each claim and the time at which they were presented. The sets created are represented in Table 1. Claims A, B, C, and D represent the four brands for each category. (Continuing from our example in the preceding section, Claim A would mean Vanity toothpaste, Claim B would mean Billabong shampoo, Claim C would mean Zokki soap, and Claim D would mean Truly mouthwash.) This was done for each of the 10 product categories, resulting in the participant viewing 20 claims at Time 1 and 40 claims at Time 2. Each set was presented to 10 participants. Participants participated in two sessions (Time 1 and Time 2) separated by an unrelated task that lasted 20 min. The experiment, which took place in a classroom, lasted 45 min.

At the onset of the first session, participants were given a rating sheet and informed that they were to evaluate the effectiveness of advertising claims. The participants were told that the statements they would see were actual statements made by members of a consumer watchdog group in Australia. They were told that consumers in the group test brands and make objective statements about the brands tested. However, they were also told that although members are well intentioned, they are not experts. Sometimes they are accurate and sometimes they are not so accurate. The statements were on separate pages of a packet. The participants were given 10 sec to rate how easy or difficult the statement was to understand.

After the distracter task, participants completed the second session. Participants were presented with a randomly ordered list of 40 statements. They were reminded that the statements were actual statements made by members of a consumer watchdog group and that the testimonials were contained in ads in Australian newspapers and magazines. They were informed that they had seen some of the claims in the first session and that others were new. They were also told that some claims were true and others were false.

Each statement was on a different page and participants were given 12 sec to read the claim and respond to the dependent measures. For each claim, participants indicated (a) how credible each statement was on a 7-point truth scale, ranging from 1 (*definitely false*) to 7 (*definitely true*), and (b) whether they recognized seeing the claim before (*yes/no*). Responses to the first question served as the primary dependent variable and responses to the second question served as a measure of subjective familiarity.

Results

Mean recognition accuracy and truth ratings are in Table 2.

Manipulation checks. To ensure that participants were correctly recognizing claims as old or new, an analysis of variance (ANOVA) was conducted on mean accuracy scores. Claims were coded as *1* if they were accurately recognized as old/new and *0* if they were inaccurately recognized as old/new. The mean percent correctly recognized was then calculated for each of the four conditions. The manipulation worked as intended; participants accurately recognized statements as being repeated. In all four conditions the mean recognition accuracy was over 94%. The results also yielded a main effect of repetition (M new = .99, M repeated =.95; $F[1, 63] = 23.78$, $p < .001$), indicating that participants were more accurate at making "new" judgments (i.e., single exposure claims) than in making "old" judgments (i.e., repeated claims).

Truth value. ANOVA using actual repetition status (old vs. new) and actual number of sources (1 vs. 2) as independent variables revealed only a significant main effect of repetition on the rated truth-value of the claim. As posited by the truth effect, repeated claims were rated as truer than new claims (M repeated = 4.23, M new = 3.94; $F[1, 63] = 17.12$, p

TABLE 2
Experiment 1 Results

Sources	*1 Exposure*	*2 Exposures*
1		
Mean recognition accuracy (1 = accurate, 0 = not accurate)	.992	.994
Mean truth rating	3.95	4.32
2		
Mean recognition accuracy (1 = accurate, 0 = not accurate)	.991	.945
Mean truth rating	3.94	4.14

Note. Truth ratings are on a 7-point scale.

< .001). The main effect of number of sources was not significant ($p > .14$), suggesting that claims made by two sources were not rated as truer than claims made by a single source. Finally, the interaction between repetition and number of sources was also not significant ($p > .25$).

Mediation analysis. To examine whether subjective familiarity (i.e., recognition) underlies the truth effect, regression analyses were conducted with truth rating for each claim as the dependent variable (Baron & Kenny, 1986). First, truth was regressed on only repetition (0 = new, 1 = repeated); the effect was significant ($\beta = .08$, $p < .001$). Next, only recognition (0 = new judgment, 1 = repeated judgment) was included in the model and it had a significant effect ($\beta = .09$, $p < .001$). When both repetition status and recognition judgment were included in the model, the effect of repetition became nonsignificant ($\beta = -.02$, $p > .6$) whereas the effect of recognition remained significant ($\beta = .11$, $p < .05$). Again, subjective familiarity as measured by claim recognition appears to mediate the truth effect.

Discussion

The results provide further evidence that subjective familiarity drives the increase in truth ratings with repetition. Further, the finding that number of sources (one vs. two) does not have a main effect on truth rating calls into question the basic assumption underlying source variability explanations for the truth effect; namely, that associating a claim with two (vs. one) sources enhances belief in the claim. Finally, results show that when credibility is held constant, the number of sources associated with the claim does not underlie enhanced belief in repeated versus new claims.

However, two limitations of this experiment must be acknowledged. First, number of sources was manipulated such that each claim was either associated with a single source or with two sources. Conceptually, the source variability explanation for the truth effect suggests that attributing a claim to two different sources on each exposure to the claim explains why truth ratings increase with repetition. Our multiple source manipulation (two sources at Time 1 and Time 2) does not map on to this conceptual explanation. A better manipulation of source variability would be to have one participant making the claim during the first exposure and a different participant making the same claim during the second exposure. Further, Experiment 1 did not check whether the number of sources manipulation worked as intended. Therefore, we lack evidence that participants accurately perceived the different number of sources. Experiment 2 addresses both these issues.

EXPERIMENT 2

In this experiment when two consumers presented a statement in the two exposures condition, one presented the statement during Session 1 and the other presented it during Session 2. Also, we included a manipulation check to test whether participants accurately perceived multiple sources.

Method

Participants and design. Eighty undergraduate and graduate students were paid $15 each for their participation. The basic design was a 2×2 within-subjects design. Item type (old: 2 exposures vs. new: 1 exposure) and number of sources (one vs. two) were repeated factors. Two sources for old items (2 exposures) referred to a different person making the claim in Session 1 versus Session 2. Two sources for new items (1 exposure) referred to two people making the claim together in Session 2 only.

Procedure. The basic experimental procedure was similar to that used in Experiment 1. The only significant modification was that when participants were shown two sources and two repetitions they saw, for example, the statement attributed to Claudia Green during Session 1 and Phyllis Evans during Session 2. In Experiment 1, if participants were shown two sources and two repetitions, they saw the statement attributed to Claudia Green and Phyllis Evans during both Session 1 and Session 2.

The statements were presented via an overhead projector at a rate of 10 sec per claim in Session 1. As in Experiment 1, participants were asked to rate how easy the claim was to understand. After the distracter task, participants were presented with a randomly ordered list of 40 statements and were given the same information as in Experiment 1. Participants were also told that some of the repeated claims were made by the same person(s) as in the first study and that others were made by different people.

In Session 2, each statement was presented for 12 sec, and participants responded to the same truth scale and recognition question as in Experiment 1. In addition, as a manipulation check on number of sources, participants were asked to write down how many customers made the claim across Sessions 1 and 2.

Results

Mean recognition accuracy, perceived number of sources, and truth ratings are in Table 3.

Manipulation checks. To ensure that participants were correctly recognizing claims as repeated or new, an ANOVA was run on mean accuracy computed as in Experiment 1. Participants were highly accurate in their old and new judgments. In all four conditions the mean accuracy was over 88%. The analysis also yielded a significant main effect of repetition (M repeated = .893, M new = .963; $F[1, 79]=34.23$, $p < .001$). As in Experiment 1, the repetition effect indicates that participants were more accurate in their "new" (i.e., sin-

TABLE 3
Experiment 2 Results

Sources	*1 Exposure*	*2 Exposures*
1		
Mean recognition accuracy (1 = accurate, 0 = not accurate)	.967	.902
Mean number of sources perceived	1.10	1.36
Mean truth rating	3.87	4.30
2		
Mean recognition accuracy (1 = accurate, 0 = not accurate)	.959	.884
Mean number of sources perceived	1.82	1.42
Mean truth rating	3.99	4.29

Note. Truth ratings are on a 7-point scale.

gle exposure) judgments than in their "old" (i.e., repeated exposure) judgments.

To ensure that participants accurately perceived the number of sources associated with a claim, we ran an ANOVA with actual repetition and actual number of sources as independent variables and perceived number of sources as the dependent variable. The results showed a significant main effect of sources (M one source = 1.23, M two sources = 1.62; $F[1, 76] = 232.02$, $p < .001$), indicating that the manipulation worked as intended. Further, the interaction between repetition and number of sources was significant, $F(1,76) = 156.84$, $p < .001$). Follow-up analyses reveal that perceptions of number of sources was greater in the two versus one source condition when claims were not repeated (M one source = 1.10, M two sources = 1.82; $F[1, 76] = 279.04$, $p < .001$). This level of accuracy for new claims is not surprising given that participants wrote in their responses when the claim with sources was still being displayed on the overhead projector. However, when the claim was repeated, participants perceived it to be from more than one source even when it was from only one source. However, mean perceived number of sources was still greater in the two different sources condition compared to the same source condition (M one source = 1.36; M two sources = 1.42, $F[1, 76] = 4.05$, $p < .05$). This finding of a mean perceived number of sources being greater than one (i.e., 1.36) simply by virtue of repetition lends credence to the assumption that participants tend to attribute repeated claims to different sources. We can now test whether enhanced belief is a result of this perception.

Truth value. Because of the interaction between repetition status and number of sources on perceived number of sources, two separate analyses were done on the truth-value rating. The first analysis examined actual repetition status and actual number of sources as in Experiment 1. The second analysis used actual repetition and perceived number of sources as independent variables. Consistent across both analyses was a main effect of repetition. As posited by the truth effect, participants rated repeated statements as more true than nonrepeated statements (actual repetition–actual sources M (one exposure) = 3.93, M (two exposures) = 4.30, $F(1, 79) = 11.1$, $p < .001$; actual repetition–perceived sources M (one exposure) = 3.96, M (two exposures) = 4.35, $F(1, 62) = 7.89$, $p < .01$). In addition, the actual repetition–perceived number of sources analysis yielded a main effect of perceived number of sources M (one exposure) = 4.06, M (two exposures) = 4.24, $F(1, 62) = 5.04$, $p < .05$). This finding suggests that claims perceived as having been made by two sources are believed more than claims perceived as having been made by a single source, regardless of repetition. No other effects were significant.

Mediation analysis. To reconfirm that subjective familiarity (i.e., recognition) underlies the truth effect, regression analyses were conducted with truth rating for each claim as the dependent variable (Baron & Kenny, 1986). We did not include the one exposure–two sources claims because they were qualitatively different from the other claims that were all associated with only one source on each exposure.

The model examined the mediating role of recognition as done in Experiment 1. As expected, repetition had a significant effect on truth rating when it was the only variable in the model ($\beta = .13$, $p < .001$) as did recognition ($\beta = .15$, $p < .001$). When recognition and repetition were both included in the model however, the effect of repetition became nonsignificant ($\beta = .01$, $p > .6$) whereas the effect of recognition remained significant ($\beta = .14$, $p < .001$). As in Experiment 1, familiarity as measured by recognition appears to mediate the truth effect.

Discussion

Results of this experiment partially support the source variability explanation for the truth effect and suggest that belief in a claim is greater when it is perceived as coming from two different sources (vs. a single source). Another approach to examining the role of source variability is to compare the mean truth rating for the "single exposure, two sources" condition with the mean truth rating for the "two exposures, each with a different source" condition. This comparison reveals a greater truth rating for the second case compared to the first case (M one exposure = 3.99, M two exposure = 4.29; $F[1, 79] = 6.19$, $p < .05$); this finding suggests that repetition has an effect independent of number of sources.

In this study, we lack clear evidence that people tend to attribute each exposure of a claim to a different source and hence, believe repeated claims more than new ones. The effects of repetition on belief appear to be mediated by recognition suggesting that subjective familiarity with the claim drives the truth effect, at least when source credibility is held constant. To fully understand the role of source variability, two additional questions need to be answered. First, do peo-

ple spontaneously use number of sources when rating the truth value of statements? Open-ended measures are needed to tap into this process. Second, we need to identify specific conditions under which source variability may increase belief in repeated statements. Experiment 3 addresses these issues.

EXPERIMENT 3

Experiments 1 and 2 used ambiguous statements that were somewhat plausible. In this case, the effects of familiarity induced by repetition on truth ratings may swamp the effects of number of sources. Use of source information is especially likely when it is both accessible and perceived to be diagnostic (Feldman & Lynch, 1988). The diagnosticity of the cue is likely to be higher when the claim has low rather than high level of plausibility. We therefore posit that people are more likely to use the number of sources cue in addition to the familiarity cue if the statement itself does not appear to be plausible. We investigate this hypothesis in the following experiment.

Experiment 3 manipulates the initial plausibility of statements. It also incorporates several modifications to the stimuli and procedure in order to enhance the salience of the number of sources manipulation. Finally, an open-ended measure asked subjects how they came up with their truth rating. These modifications are described in detail in the following sections.

Method

The basic experimental procedure was modified to show testimonials in three sessions rather than two. The same testimonials were shown in the first and second session (although the order was changed). In the third session, the testimonials from the first two sessions were shown, as well as some new testimonials. This resulted in half the testimonials in the third session being new and half being repeated. This modification was made to increase source variability, such that some of the testimonials were attributed to one source whereas others were attributed to three sources (rather than two sources as in the previous experiments).

Participants and design. Participants were 60 undergraduate and graduate students who were paid $10 each for their participation. Item type (old: 3 exposures vs. new: 1 exposure) was manipulated between-subjects and the number of sources between-subjects manipulation was nested within the 3 exposures condition (3 exposures, same source vs. 3 exposures, 3 sources). Item plausibility (low vs. high) was a within-subjects factor.

Stimuli. Twenty testimonials were pre-tested to determine how plausible people found them on initial inspection. Thirty-two undergraduate and graduate students were shown 20 statements for 12 sec each and asked to rate the statements' truth values on 7-point scales, ranging from 1 (*definitely false*) to 7 (*definitely true*). Based on the results, the 20 statements were divided into two categories of 11 low plausibility statements ($M = 3.12$) and 9 high plausibility statements ($M = 4.57$; $F[1, 27] = 53.35$, $p < .001$).

Rather than attributing a customer name to each statement as was done in the first two experiments, all the statements in each session of this study were attributed to one of three consumer watchdog groups. So instead of reading "Billabong shampoo leaves hair shiny with no residue."—Claudia Green; participants would read ***Sydney Shoppers*** says: "Billabong shampoo leaves hair shiny with no residue." The names of the consumer watchdog groups were designed to maintain equivalent credibility between the groups. The names were Canberra Consumers, Perth Purchasers, and Sydney Shoppers. Bolding and italics were used to increase the salience of the source.

Procedure. At each session, the claims shown were all attributed to one source. For example, in Session 1, participants were told that "the testimonials you are about to see are actual testimonials made by a consumer watchdog group in Canberra, Australia called ***Canberra Consumers***." Additionally, each of the 10 testimonials was displayed on a separate page with the heading "***Canberra Consumers*** says." Of these 10 claims, six were of low plausibility and four were of high plausibility.

In the second session, the same 10 statements were shown and were either attributed to the same source or to a different source. Participants were told that "the testimonials you are about to see are actual testimonials made by a consumer watchdog group in Canberra, Australia called ***Canberra Consumers*** (the same group as in the previous study)." Or "… in Perth, Australia called ***Perth Purchasers*** (a different group than in the previous study). Again each statement was displayed on a separate page with the heading, "group says" (with the group's name inserted).

In the third session, half the statements (i.e., 10) were those shown in the first two sessions, half the statements (i.e., 10) were new. Some participants were told that

> The testimonials you are about to see are actual testimonials made by a consumer watchdog group in Canberra, Australia called ***Canberra Consumers*** (the same group as in the previous two studies). ***Canberra Consumers*** is reiterating some of the testimonials they made in the previous two studies, but they are also making some new ones.

Other participants were told that

> the testimonials you are about to see are actual testimonials made by a consumer watchdog group in Sydney, Australia called ***Sydney Shoppers*** (a different group than in the previ-

ous study). ***Sydney Shoppers*** is reiterating some of the testimonials that ***Canberra Consumers*** and ***Perth Purchasers*** made in the previous two studies, but they are also making some new ones.

This resulted in six sets counterbalancing which group made the claims at each session. The sets created are represented in Table 4.

In the first session, participants were asked to evaluate the effectiveness of 10 advertising testimonials. They were given 10 sec to rate how difficult or easy the testimonial was to understand. There was then a distracter task of 10 min before the second session began. In this session, participants were asked to evaluate the clarity of the same 10 advertising testimonials. They were given 10 sec to rate how unclear or clear the testimonial was. There was then a second distracter task of 10 min before the third session began. In the third session, participants were given 12 sec to read each of 20 testimonials and indicate (a) To what extent they believed the testimonial, ranging from 1 (*definitely false*) to 9 (*definitely true*), and (b) in general, how familiar the testimonial was to them, 1 (*very unfamiliar*) to 9 (*very familiar*). After rating all statements (11 low and 9 high plausibility), the participants were asked to describe how they came up with their answers when they rated the truth.

Results

New claims associated with one source, repeated claims associated with one source, and repeated claims associated with three sources represent the three between-subject conditions in this study; claim plausibility is the within-subjects factor. Mean familiarity and truth ratings are in Table 5. One-tailed tests are reported given the directional nature of the hypothesis.

Manipulation checks. To check that the manipulation of plausibility worked, a repeated measures ANOVA was run on the truth ratings of low versus high plausibility claims. Results reveal a significant effect of plausibility (M low plausibility = 4.70, M high plausibility = 6.26; $F[1, 42] = 59.16$, $p < .001$).

To ensure that participants did perceive the repetition of statements, a mixed ANOVA was done on familiarity. Results revealed a significant main effect of exposure–source condition, $F(2, 42) = 8.51$, $p < .001$). Follow up contrasts revealed that items seen repeatedly were significantly more familiar than items seen only once (M new = 3.69, M repeated/one source = 6.59; $F[1,42] = 12.59$, $p < .001$; M new = 3.69, M repeated/three sources = 6.64; $F[1, 42] = 12.95$, $p < .001$).

TABLE 4
Experiment Three Stimuli Sets

Set	*Session 1*	*Session 2*	*Session 3*
1	Canberra consumers	Sydney shoppers	Perth purchasers
2	Sydney shoppers	Perth purchasers	Canberra consumers
3	Perth purchasers	Canberra consumers	Sydney shoppers
4	Sydney shoppers	Sydney shoppers	Sydney shoppers
5	Canberra consumers	Canberra consumers	Canberra consumers
6	Perth purchasers	Perth purchasers	Perth purchasers

TABLE 5
Experiment 3 Results

Plausibility	*1 Exposure 1 Source*	*3 Exposures 1 Source*	*3 Exposures 3 Sources*
Low			
Mean familiarity	3.54	6.59	6.76
Mean truth rating	4.19	4.68	5.24
High			
Mean familiarity	3.83	6.60	6.52
Mean truth rating	6.43	6.05	6.30

Note. Familiarity and truth ratings are on 9-point scales.

Truth value. A 2 × 3 mixed ANOVA on the truth value for low versus high plausibility claims and the different exposure–source conditions showed a significant interaction effect, $F(2, 42) = 3.08$, $p < .05$), as well as the expected main effect of plausibility, $F(1, 42) = 59.16$, $p < .001$). Follow-up contrasts provide support for the hypothesis that number of sources will enhance repetition-based belief for low plausibility claims but not for high plausibility claims. For the low plausibility claims, contrasts reveal that there was a significant difference between new claims and repeated claims from three sources (M new = 4.19, M repeated/three sources = 5.24; $F[1, 42] = 3.23$, $p < .05$), but no difference between new claims and repeated claims from one source (M new = 4.19, M repeated/one source = 4.68; $p > .4$). In the high plausibility condition there were no differences between the new claims and repeated claims from one source (M new = 6.43, M repeated/one source = 6.05, $p > .4$), or between new claims and repeated claims from three sources (M new = 6.43; M repeated/three sources = 6.30; $p > .8$). Note that these ratings are on a 9-point scale, making a ceiling effect explanation less likely.

Free response data. Analysis of the free response data showed that participants believed that they based their truth ratings mainly on plausibility of the statement (85%). Only 5% of participants even mentioned the number of sources, and all these subjects also mentioned the plausibility of the statement. 12% of participants also mentioned that they factored in how familiar the statement felt.

Discussion

Results of this experiment support the idea that source variability can enhance the effect of repetition on belief. The truth

effect has been shown to hold for ambiguous statements, statements where the veracity of statements could not be judged independent of exposure. However, this study shows that the truth effect does occur for seemingly less plausible statements; however this occurs only under conditions where the multiple repetitions can be attributed to multiple sources. As expected, repetition does not increase truth rating of plausible claims. The free response data suggest that subjects had no access to their use of number of sources in rating the truth value. Instead, subjects seized on the most likely explanation for their ratings—the plausibility of the claim. It appears that the use of source variability is an automatic process.

GENERAL DISCUSSION

Our research adds to a growing body of literature on the mechanisms underlying the truth effect and its generalizability (e.g., Hawkins & Hoch, 1992; Hawkins, Hoch, & Meyers-Levy, 2001). In Experiments 1 and 2, we replicate the finding that people believe a claim more when they are exposed to it repeatedly. Results show that this enhanced belief appears to be driven by greater familiarity with the claim rather than by the attribution of each exposure of the claim to a different source. In Experiment 3, we demonstrate that source variability can play a role in enhancing repetition-induced belief. When claims are less plausible, feelings of familiarity engendered by repetition alone are not sufficient to enhance belief in the claim. However, exposure to the less plausible claim multiple times, each time from a different source, does enhance belief in repeated versus new claims.

Previous research suggesting that perceived number of sources enhances the truth effect appears to have confounded the effects of source credibility with number of sources. Most of this research has used within-experiment versus outside-experiment measures to examine perceived number of sources. Clearly, perceptions of having heard a statement outside the experiment also increase the perceived credibility of the statement. Thus, the enhancements in belief of repeated claims perceived to have been heard outside (vs. in) the experiment may have been due to source credibility.

Our work focuses on fictitious sources, thus removing any credibility confounds from the results. An interesting direction for future research would be to examine the effects of number of sources on claims spanning the plausibility continuum. We also used a very salient manipulation of source in the third experiment. Subjects were explicitly told how many sources were making the claims in the cover sheet. Whether these source effects obtain when the source cue is less salient is another interesting issue. Finally, the use of familiarity and source variability appear to be automatic—people have no access to their use of these cues in making validity judgments. Further research is needed on this automaticity issue.

Our results have practical implications for advertisers. Companies often include testimonials in their ads. It is important for these companies to realize that associating a statement with more than one source will enhance belief in the claim, as long as consumers perceive the multiple sources. In addition, repeatedly showing the statement will also enhance belief. Perhaps the greatest benefit will derive from repetition of statement claims with different endorsers associated with each repetition. Although this research yields some initial insights for marketers, future research is needed to more fully examine the effects of source credibility and source variability on beliefs. One interesting direction is to examine repetition-induced enhancements of belief for externally presented assertion claims versus internally generated inferences from implication claims. We speculate that consumers are likely to accord more credibility to internally generated information and are likely to feel more familiar with the generated conclusion given the cognitive operations performed on the implication claim. This, in turn, is likely to enhance the truth effect. Research is currently under way to examine this issue.

ACKNOWLEDGMENTS

Anne Roggeveen is Assistant Professor at Babson College and Gita Venkataramani Johar is Associate Professor, at Columbia University, Graduate School of Business. Both authors contributed equally to the article.

We thank Andrew Gershoff, Don Lehmann, and Michel Pham for their comments on versions of the article.

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Accepted by Dawn Iacobucci.