The Photo-Truthiness Effect: The Influence of Nonprobative Photos on Truth Judgments in a 2-Phase Procedure

by

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B.A., Vancouver Island University, 2018

A Thesis Submitted in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

in the Department of Psychology

University of Victoria

We acknowledge and respect the Lək̓ʷəŋən (Songhees and Xʷsepsəm/Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

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Abstract

Truthiness is the belief or assertion that a statement is true based on intuition and subjective perception rather than evidence or critical examination. Recent research has demonstrated that the presence of a nonprobative photo - an image that is related to a claim but provides no direct evidence for it - can increase the probability that a person will judge the claim as true. This photo-truthiness effect is hypothesized to occur because such images enhance processing fluency, making the claim easier to process and bringing related concepts to mind. This increased fluency is then misattributed to familiarity and truth, making people more likely to judge the statement as true. In most photo truthiness studies, participants evaluate claims in a 1-phase procedure, whereby they see a claim with or without an accompanying photo and immediately judge its veracity. This design facilitates processing of both the claim and the photo simultaneously, potentially leading some to discount the photo's influence. The present research introduces a 2-phase procedure, in which participants first view trivia claims with or without an associated photo and only later, in a separate phase, judge the truth of those claims in isolation. This temporal separation of photos and judgements was designed to reduce awareness of the photo's influence when judging claims, thereby increasing the photo-truthiness effect. It also introduces a repetition of the claims, which has previously been shown to increase the likelihood that they are judged as true. Across six preregistered experiments, the effect of separating photo presentation from truth judgments on the truthiness effect was tested. Results confirmed that claims with photos were more often judged as true than claims without photos. However, the 2-phase procedure did not produce a significantly larger effect than the 1-phase procedure in any of the experiments nor in an analysis across experiments. Item-level analyses revealed that some statements were more susceptible to truthiness effects than others, and in some cases, the

presence of a photo even reduced reported truth (a “falsiness” effect). Response time analyses provided some support that truth judgments were more strongly influenced by photos when participants made rapid decisions, consistent with the idea that truthiness is driven by fluency rather than deliberate reasoning. These findings suggest that the cognitive mechanisms underlying truthiness - such as fluency and source-monitoring errors - are robust across presentation formats, and that the strength of the effect may depend more on the characteristics of individual items than on when photos are presented.

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Introduction

Assessing the accuracy of information involves the interplay of multiple cognitive processes, integrating both deliberate reasoning and intuitive judgments. While analytic thinking enables individuals to critically evaluate evidence, intuitive processes facilitate rapid decision-making based on heuristics and subjective impressions (Evans & Stanovich, 2013; Kahneman, 2011; Wason & Evans, 1974). Under certain conditions, reliance on intuition can lead to systematic biases in judgment, one of which is the "truthiness effect". This phenomenon occurs when individuals judge statements as more credible simply because they are easy to process, even in the absence of supporting evidence (Newman et al., 2012).

Recent research has demonstrated that photos, even when designed to be non-probative, can play a significant role in shaping these intuitive truth judgments. A non-probative photo is an image that relates to a claim but provides no direct evidence as to its veracity (Newman et al., 2012, 2015). For example, people are more likely to endorse the statement, "Macadamia nuts are in the same evolutionary family as peaches," when shown a picture of a bowl of macadamia nuts, even though the image provides no information about their evolutionary relationship (Newman et al., 2012, 2015). The photo-truthiness effect refers specifically to the difference in truth judgments between claims accompanied by a non-probative photo and those presented without one. In a typical experiment investigating the effect, participants view claims either paired with non-probative photos or no photos (e.g., a white box as a photo placeholder), and judge them to be true or false.

Although no formal meta-analysis of the photo-truthiness effect has been conducted, a review of selected studies (Abed et al., 2017; Derksen et al., 2022; Fenn et al., 2013; Mangus,

2018; Newman et al., 2012, 2014, 2015, 2015; Zhang et al., 2021) suggests that effect sizes typically fall around Cohen's $d = .20$, though publication bias may inflate these estimates. This small but reliable effect suggests that non-probative photos subtly and consistently increase the probability of judging a claim as true. Although the effect size is modest, its consistency across experiments and over time is notable. For example, in one study, participants evaluated the accuracy of trivia statements, with half accompanied by related but non-probative photos and the other half presented without images. After a 48-hour delay, participants returned to evaluate the same statements, this time without any accompanying photos. The results showed that the influence of photos on perceived truthfulness remained robust, with the truthiness effect showing little diminishment over time (Fenn et al., 2013). Moreover, this photo-truthiness effect appears to remain stable between age groups, as evidenced by research showing no significant age-related variations in the strength of the effect (Derksen et al., 2022).

Related but non-probative photos can inflate truth judgments, potentially independent of the claim's content. In a series of experiments by Newman et al. (2012), participants evaluated whether a celebrity was alive ("True or False: This person is alive"). Half of the names were accompanied by a non-probative photo - an image depicting the celebrity in a professional context - while the other half were presented without images. As expected, participants were more likely to judge the celebrity as alive when a photo was included. Surprisingly, the same effect occurred when a separate group of participants assessed whether a celebrity was dead ("True or False: This person is dead"). Despite offering no evidentiary support, the photos increased belief in both opposing claims.

These findings raise important questions about the underlying cognitive processes driving this effect. One promising explanation comes from the fluency account of truthiness, which

suggests that a non-probative photo sometimes helps people understand a claim or imagine reasons to believe it. Fluency refers to the ease with which information is processed, and research suggests that when people can process a claim more easily (e.g., through the presence of a related photo), they may misattribute this ease to the truth of the claim (Jacoby et al., 1989; Leboe-McGowan & Whittlesea, 2013; Newman et al., 2012; Reber & Schwarz, 1999; Scholl et al., 2014; Unkelbach, 2007). This ease of processing can lead individuals to mistake it for evidence of the claim's truth, reflecting a fluency-based misattribution. Such misattributions may contribute to source monitoring errors, wherein people struggle to distinguish between the subjective experience of ease and actual evidence (Johnson et al., 1993).

In two studies conducted by Zhang et al. (2021), participants were presented with comparative claims where half saw claims about easy-to-visualize commodities (e.g., “Shrimp will have increased more in price than Rose in three months”), while the other half saw claims about difficult-to-visualize commodities (e.g., “Betal will have increased more in price than Leghorn in three months”). A third of the claims appeared with a photo of the subject (e.g., Shrimp for the high and Betal for the low imageability group), a third with a photo of the referent (e.g., Rose for the high and Leghorn for the low imageability group), and a third with no photo. Photos of the subject were expected to facilitate easier processing, while photos of the referent were anticipated to impede it. The findings showed that photos of the subject increased claim acceptance (i.e., a truthiness effect), while photos of the referent decreased acceptance (i.e., a reversed truthiness effect, or a "falsiness" effect). These effects align with a fluency account, which suggests that subject photos increase claim acceptance by facilitating processing, particularly for difficult-to-visualize subjects. In contrast, referent photos hinder processing and reduce acceptance, especially when the subject is already easy to visualize.

Furthermore, Newman et al. (2014) found that easily pronounceable names increased truthiness for associated claims, reinforcing the idea that processing ease enhances belief. This suggests that when information is easier to process, people are more likely to accept it as true. Such fluency-driven effects highlight how effortless cognitive processing can be misinterpreted as a cue for truth.

The photo-truthiness effect, however, appears to depend on comparative fluency. In a series of experiments exploring how photos influence truth judgments, different design structures revealed varying effects. First, in a within-subjects design where participants judged claims paired with a mix of related, unrelated, or no photos, related photos produced a clear truthiness effect, while unrelated photos had no significant impact compared to no photos. Second, in a mixed design, all participants judged claims paired with either a photo or no photo (within-subjects). However, for half of the participants, all photos were related to the claims, while for the other half, all photos were unrelated (between-subjects). While related photos again produced truthiness, unrelated photos led to a "falsiness" effect, increasing claim rejection. Lastly, in a fully between-subjects design, where each participant saw claims paired only with related photos, unrelated photos, or no photos, neither truthiness nor falsiness effects emerged. This suggests that the comparative context in within- or mixed-subjects designs is necessary to elicit these biases (Newman et al., 2015). It is also possible that an effect existed, but the between-subjects design was not powerful enough to detect it. However, the observed effect size was small ($\eta^2 = .01$).

Building on this, Abed et al. (2017) examined how photos paired with personality descriptions influenced truth judgments as a function of participants' familiarity with the targets. Photos had a stronger impact on lesser-known individuals, amplifying the discrepancy between

actual and expected fluency. In contrast, for well-known individuals, such as oneself or close friends, the photo's influence was diminished due to extensive background knowledge. This suggests that a photo's contribution to truthiness is most pronounced when prior knowledge is limited, underscoring the role of fluency gaps in shaping these effects.

There appears to be a mechanism whereby the presence of a photo enhances processing fluency, making a claim feel easier to evaluate relative to others, thereby increasing belief in its truth. This effect has been attributed to photographs not only facilitating processing but also eliciting related thoughts and mental imagery, which can enhance familiarity and coherence - both of which contribute to a greater likelihood of judging the claim as true (Abed et al., 2017; Cardwell et al., 2017; Fenn et al., 2013; Newman et al., 2012, 2014, 2015). This aligns with Whittlesea and Williams' (2000) argument that it is not just fluent processing that influences judgments, but rather the discrepancy between expected and actual fluency. Whittlesea and Williams (2000) primarily discuss familiarity judgments, proposing that individuals perceive stimuli as familiar when processing is unexpectedly easy. However, this same mechanism can be misattributed to truth judgments, where enhanced processing fluency - facilitated by the presence of a photo - leads participants to infer that a claim is more likely to be true. Consequently, truth judgments may be amplified when individuals experience an unexpectedly smooth processing experience, fostering confidence in the claim’s veracity.

The fluency account is currently the most compelling explanation for the photo-truthiness effect. While reducing comparative fluency can minimize, remove, or even reverse this effect, attempts to enhance it beyond its typical size have proven challenging. To date, no study has provided clear evidence of a significant increase in the effect. Several experimental conditions, however, may be responsible for keeping the effect relatively low and stable across different

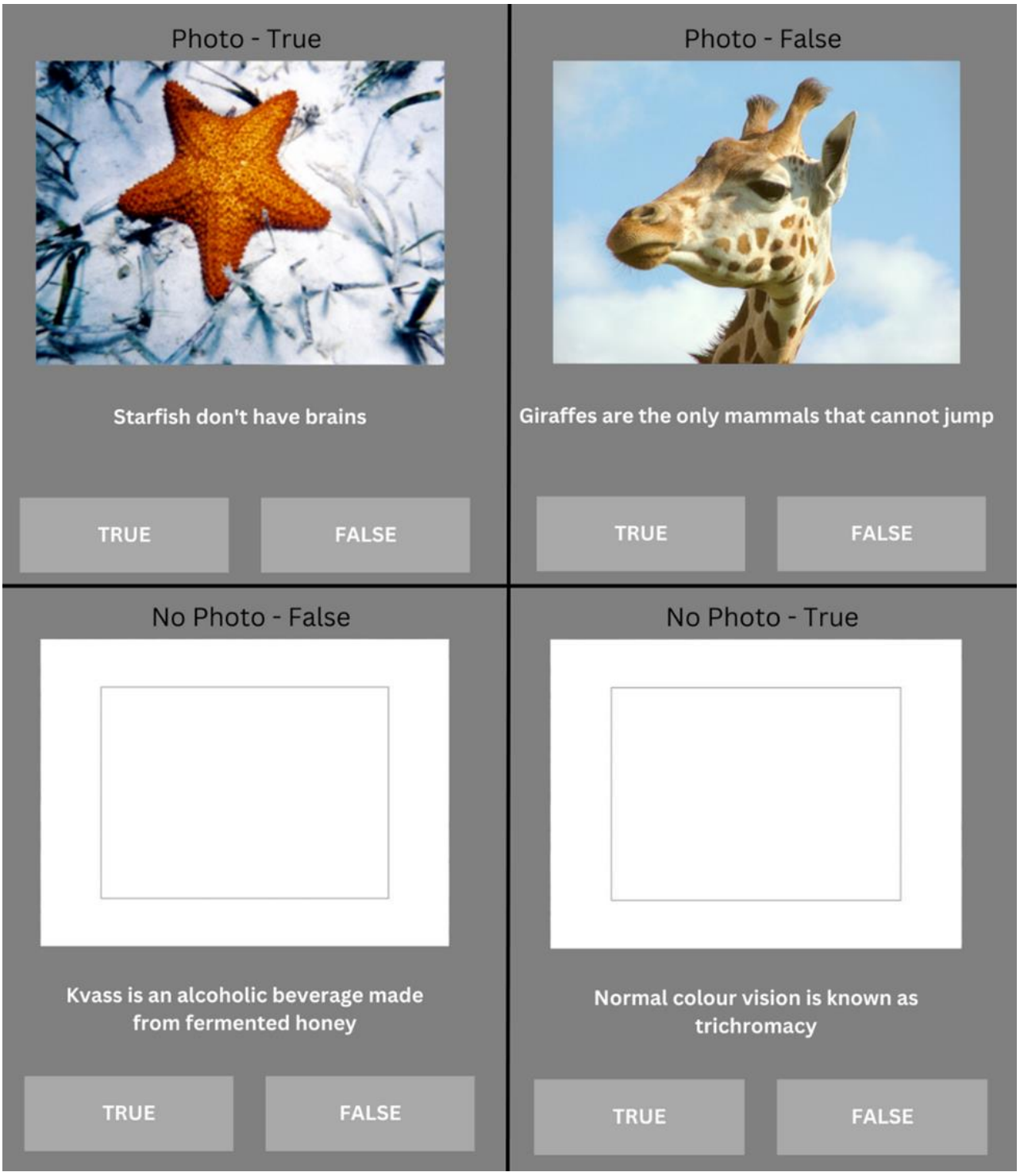
contexts. In the standard truthiness procedure, the photo is present when subjects make their truth judgment, which could make them aware of the photo's influence and lead them to discount it as evidence of truth. Generally, making the source of an influence less noticeable can reduce people's ability to discount it (Kelley & Lindsay, 1996). A reduction in discounting should increase the size of the truthiness effect. Additionally, the sleeper effect may help reduce this discounting over time; initially, participants might discount the photo, but as time passes and the source fades from memory, the claim itself might gain additional credibility (Kumkale & Albarracín, 2004). The present experiments aim to manipulate these factors by temporally dissociating the presentation of photos from truth judgments, thereby minimizing the likelihood that the photo's influence is discounted. This approach is intended to weaken source memory while potentially allowing the sleeper effect to amplify the truthiness effect over time.

To test this, a 2-phase truthiness procedure was utilized. In phase 1, participants saw 62 trivia claims: 28 claims were shown with a related photo, 28 were shown alone, and 6 filler claims were shown with an unrelated photo. Participants had to identify if the claim was presented with a related photo, no photo, or an unrelated photo, ensuring they processed the claim and accompanying photo fully. After a 5- to 10-minute filler task, participants saw the 56 non-filler claims again in phase 2, in a new random order without photos, and judged each as true or false. Another group judged the truth of 56 claims presented alone or with a related photo in a single phase (the 1-phase procedure). It was hypothesized that in the 2-phase condition, reading a claim in phase 2 might trigger memories of the related photo from phase 1, aiding in processing the claim and in generating reasons to believe it. It was hypothesized that separating the photo presentation from the truth judgment might make the photo's influence less apparent,

reducing discounting and thereby increasing the photo's influence compared to the 1-phase condition in which claims and photos are presented simultaneously.

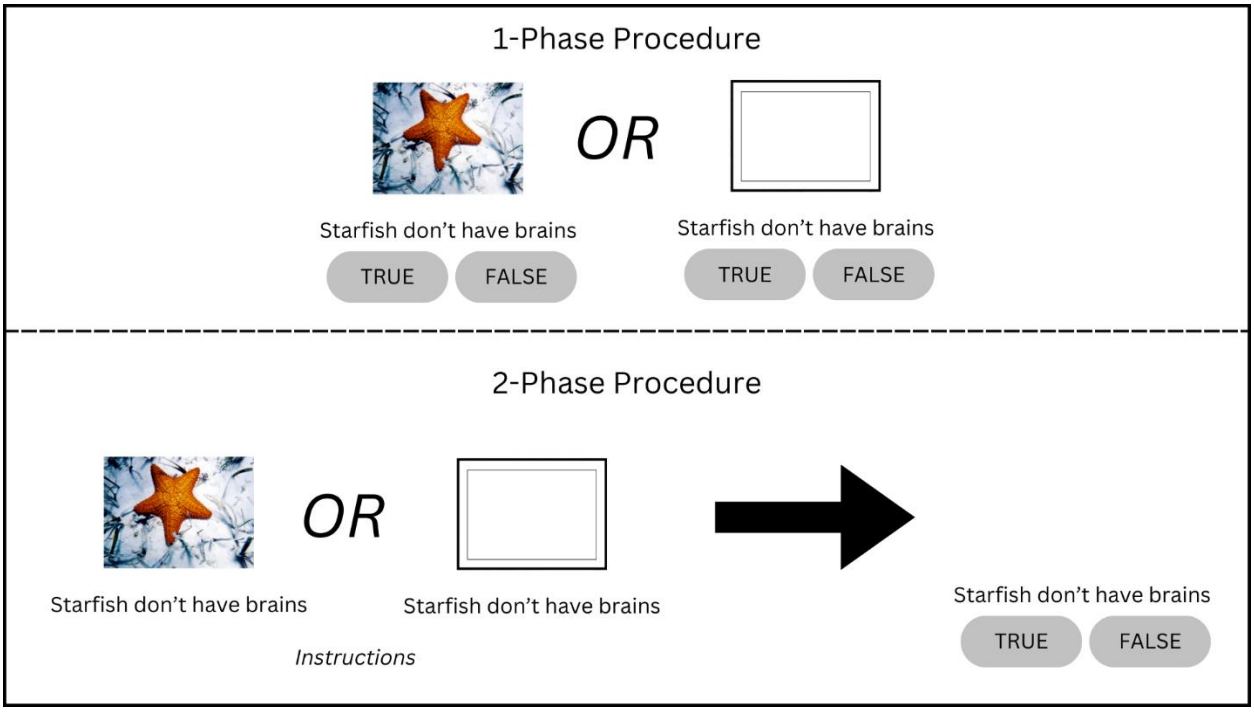
Six experiments on the 2-phase procedure were conducted. Each of the six experiments was preregistered; see www.osf.io/zaerw for links to the pre-registrations. Experiments 1, 2, and 3 were implemented, conducted, and initially analyzed by Kaitlyn Fallow under the supervision of Steve Lindsay with input from Eryn Newman and Hartmut Blank. Experiments 4, 5, and 6 were implemented, conducted, and analyzed by Bennett King-Nyberg under the supervision of Steve Lindsay. Bennett also re-analyzed the data from the first three experiments.

Figure 1. Sample Stimuli for the 1-Phase Experiment



Note: The top-left section displays a photo-present true claim, the top-right a photo-present false claim, the bottom-left a photo-absent false claim, and the bottom-right a photo-absent true claim. These represent the standard presentation categories in the 1-phase procedure.

Figure 2. Comparison of the 1-Phase and 2-Phase Procedures



Note: The 1-phase Procedure presents a trivia claim with either an accompanying photo or no photo, and participants immediately judge its truthfulness. The 2-phase procedure separates image exposure from the truthfulness judgment, introducing a delay between viewing the image (or blank) and making a decision. Instructions during phase one of the 2-phase procedure varied by experiment.

Experiments 1, 2, and 3

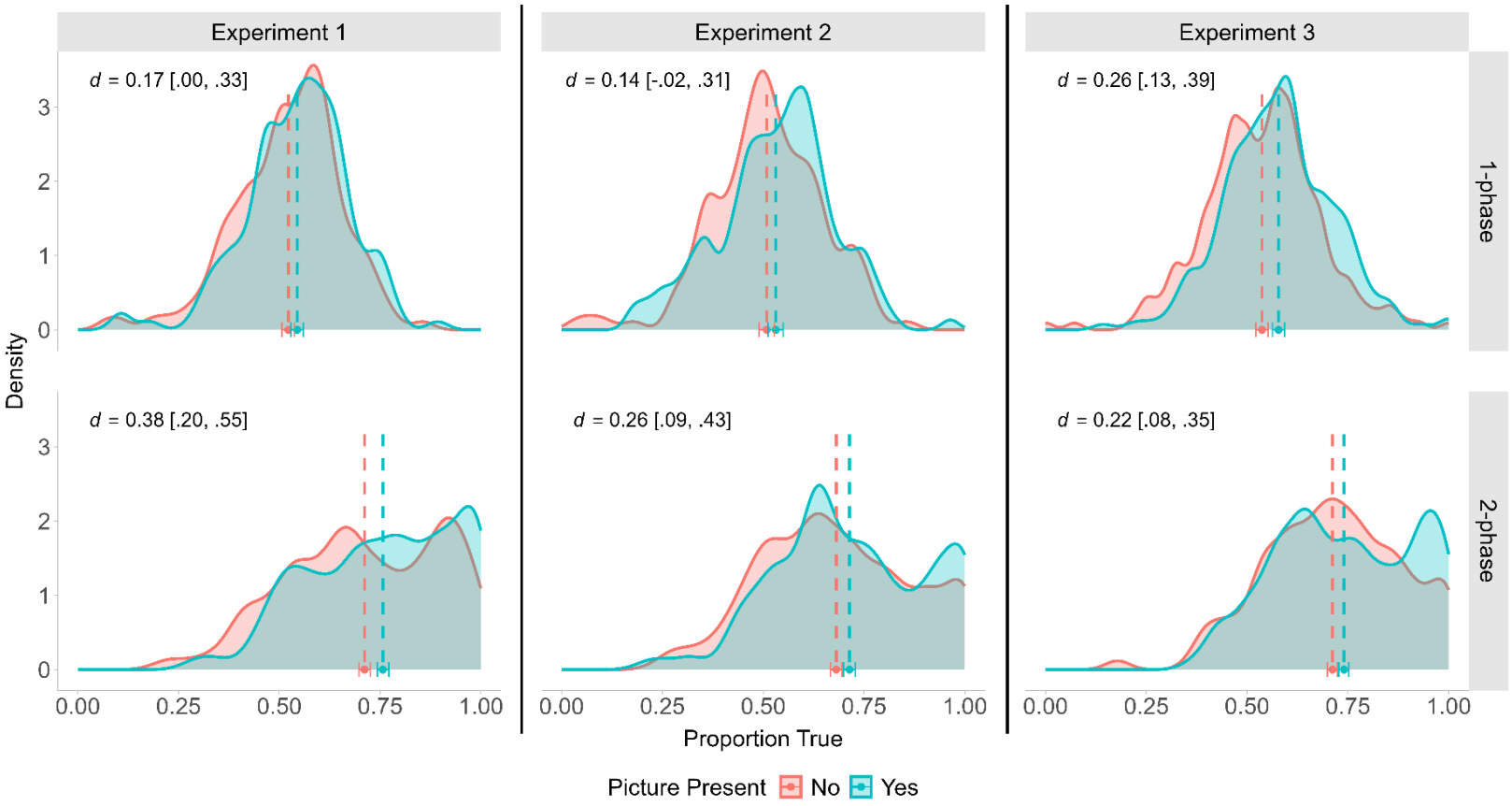
These first three experiments were conducted using Qualtrics and data were collected online. Because Qualtrics doesn't support random item assignment for each subject, blocked counterbalancing was used. Sixty-two items that performed well in previous studies were chosen

and divided into sets (A and B) of 56 claims and 6 fillers, matched for control performance and the size of the truthiness effect. In all experiments, participants gave informed consent and then, in the 1-phase condition, made true/false judgments for trivia claims presented individually, with half accompanied by a related photo and half with a blank. In the 2-phase condition, participants first completed phase 1, viewing 56 trivia claims (half with a related photo, half without), plus 6 claims with unrelated photos. They reported whether each claim was paired with a related photo, no photo, or an unrelated photo. After a 5- to 10-minute filler task, they made true/false judgments on the 56 trivia claims presented alone. The outcome variable was the proportion of "true" responses based on whether a claim was presented with or without a related photo. See Figures 1 and 2 for details.

Experiments 1 (1-phase: $N = 141$, 2-phase: $N = 140$) and 2 (1-phase: $N = 139$, 2-phase: $N = 137$) recruited participants via Prolific. Experiment 2 directly replicated Experiment 1, differing only in collection dates and subjects. To account for small, unintended differences in counterbalancing in the first two experiments, sets A and B were rebalanced in Experiment 3 to ensure equivalent truthiness effect sizes based on the results from Experiments 1 and 2. Experiment 3 (1-phase: $N = 223$, 2-phase: $N = 220$) participants were undergraduate students from the University of Victoria; restricting the sample in this way was intended to reduce error variance compared to the Prolific samples used in the first two experiments. Participants who responded “false” to every item were removed. Because the 2-phase condition showed a large increase in the proportion judged as true, participants who responded 'true' to every item were included, as it was considered part of the observed effect. A 2 (photo: present, absent) x 2 (phase: 1-phase, 2-phase) mixed design was used, manipulating photo within subjects, and phase between subjects. Figure 3 displays the proportion of claims judged “True” as a function of

photo/no photo for each subject in each of Experiments 1, 2, and 3. *Note:* For all kernel density estimate plots, error bars are within-subjects 95% confidence intervals (Loftus & Masson, 1994).

Figure 3. Kernel Density Estimate Plots of Proportion True for Picture Present/Absent in Experiments 1, 2, and 3.

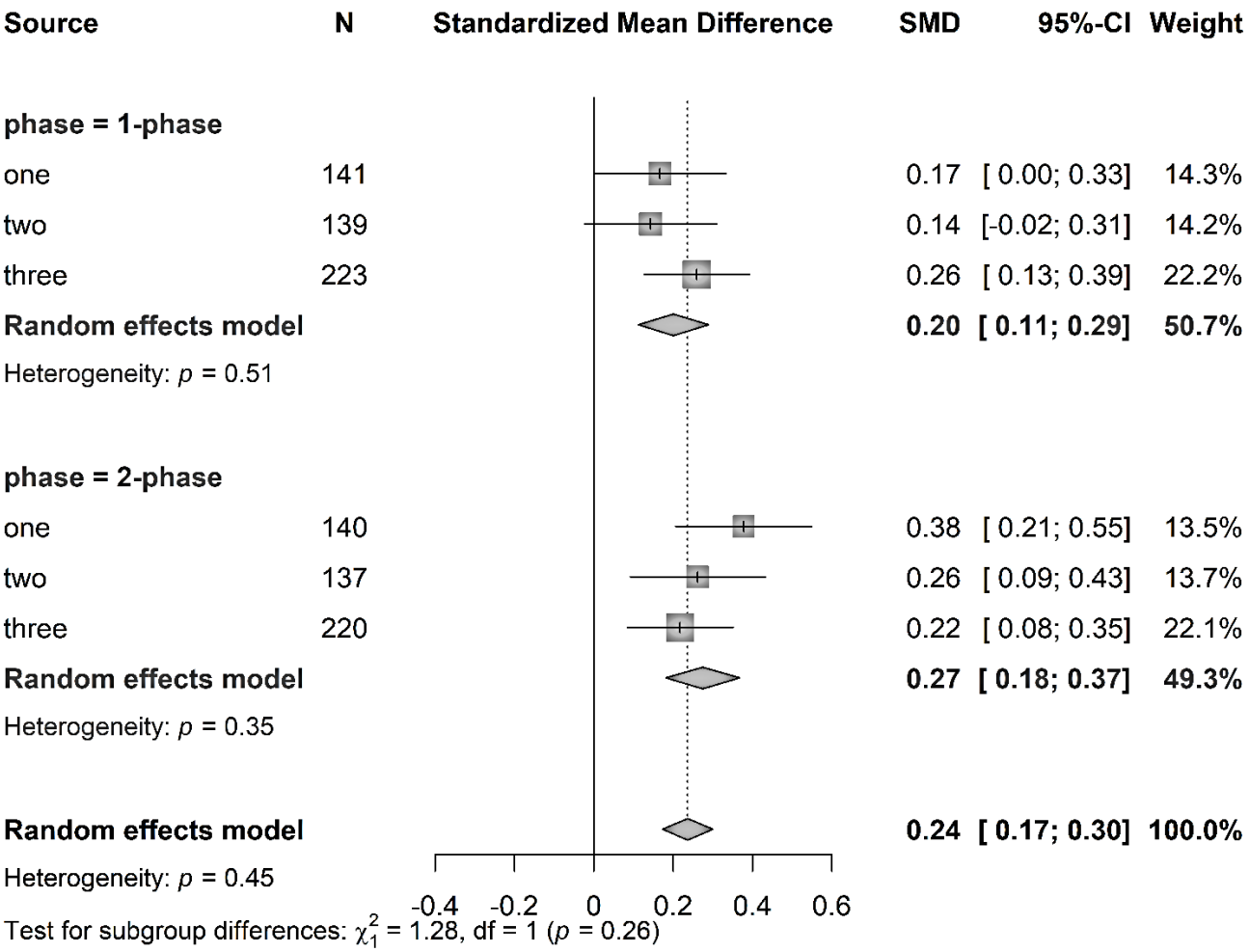


Note: Cohen's *d* was found using the *Meta* R package.

The most striking aspect of the data in Figure 3 is that trivia claims were much more often judged "true" in the 2-phase condition than in the 1-phase condition. In a mini-meta-analysis across these three experiments, Cohen's *d* for that effect was estimated as 1.13, 95% CI [0.99, 1.26]. There is prior literature on the effects of repetition on belief in claims (Bacon, 1979; Begg et al., 1992; Begg & Armour, 1991; Kelley & Lindsay, 1993; Stump et al., 2025; Unkelbach & Rom, 2017), so the finding is not new, but its magnitude impresses.

As predicted, a statistically significant truthiness effect emerged, though the effect size was small (mini meta-analysis: $d = 0.24$, 95% CI [0.17, 0.30]). The 2-phase experiments ($d = 0.27$, 95% CI [0.18, 0.37]) were directionally but not significantly ($\chi^2(1) = 1.28$, $p = .26$) larger than the 1-phase experiments ($d = 0.20$, 95% CI [0.11, 0.29]). Figure 4 displays the effect sizes by experiment and phase type. Across all three experiments, there was little support for the key hypothesis; truthiness was not significantly greater in the 2-phase condition than in the 1-phase condition. See Figure 4 for meta-analytic details.

Figure 4. Forest Plot of Experiments 1, 2, and 3



Experiments 1 and 2 showed some differences in the counterbalances. A multilevel model with counterbalance (CB) as a factor revealed that there was a significant interaction between picture present and CB in Experiment 1, indicating that the truthiness effect varied depending on the counterbalancing condition. In Experiment 2, no significant interactions were found, but plots of the data suggested that there were hints of differences in the CB. To address this, in Experiment 3, items were reassigned to counterbalance sets based on the truthiness effects observed in the first two experiments, with the aim to equalize them. This adjustment was largely successful as there was no indication of larger truthiness effects for one counterbalance over the other. However, a small and non-significant difference in the proportion of "True" responses

between counterbalancing conditions emerged. Including all three experiments in the model reinforced this pattern, with the picture present - CB interaction remaining significant and an additional main effect of CB emerging (see Appendix A). One motivation for Experiment 4 was to avoid blocked counterbalancing.

Experiment 4

The three experiments reported above offered little if any support for the hypothesis that the truthiness effect would be larger in the 2-phase procedure than in the 1-phase procedure. In Experiments 1 and 2 the difference in truth ratings for photo-absent versus photo-present items was directionally slightly greater in the 2-phase procedure than in the 1-phase procedure, but that difference was not significant, and in Experiment 3 it was directionally reversed. The mini-meta-analysis indicated a small superiority of truthiness in the 2-phase condition, but the confidence intervals substantially overlapped. It was speculated that unintended counterbalancing differences in these block-counterbalanced studies might have obscured the predicted superiority of the 2-phase procedure as a way of inducing truthiness. Furthermore, the pilot studies were conducted online, which may have added error variance. In Experiment 4, the assignment of items to the photo and no-photo conditions was randomized anew for each subject. Subjects were University of Victoria undergraduates tested in person and under supervision in small groups; these changes were intended to reduce error variance.

Method

The participants were 240 undergraduate psychology students from the University of Victoria, Canada. After applying pre-registered exclusionary criteria, the final sample consisted of 202 participants (1-phase: N = 103, 2-phase: N = 99). A 2 (photo: present, absent) x 2 (phase:

1-phase, 2-phase) mixed design was used, manipulating photo within subjects, and phase between subjects. The outcome variable was the proportion of claims judged as true. Participants completed the experiment individually in a computer lab using PsychoPy software. Sixty-two distinct claims were presented: 28 with a related photo, 28 with no photo, and 6 filler items with unrelated photos. Assignment of claims to conditions was randomized anew for each subject, as was item order. In the 1-phase condition, each claim was presented with a related photo, no photo, or an unrelated photo until the participant judged it as true or false via mouse press. In the 2-phase condition, participants saw each claim for 5 seconds followed by a related photo, a blank photo, or an unrelated photo, then indicated which type of photo was shown. After completing all 62 pairs, participants completed a distraction task (8 puzzles and 14 mental rotation questions). In the second phase, each claim was displayed alone for a true/false judgment. Due to an oversight when coding the experiment, response time data were not recorded.

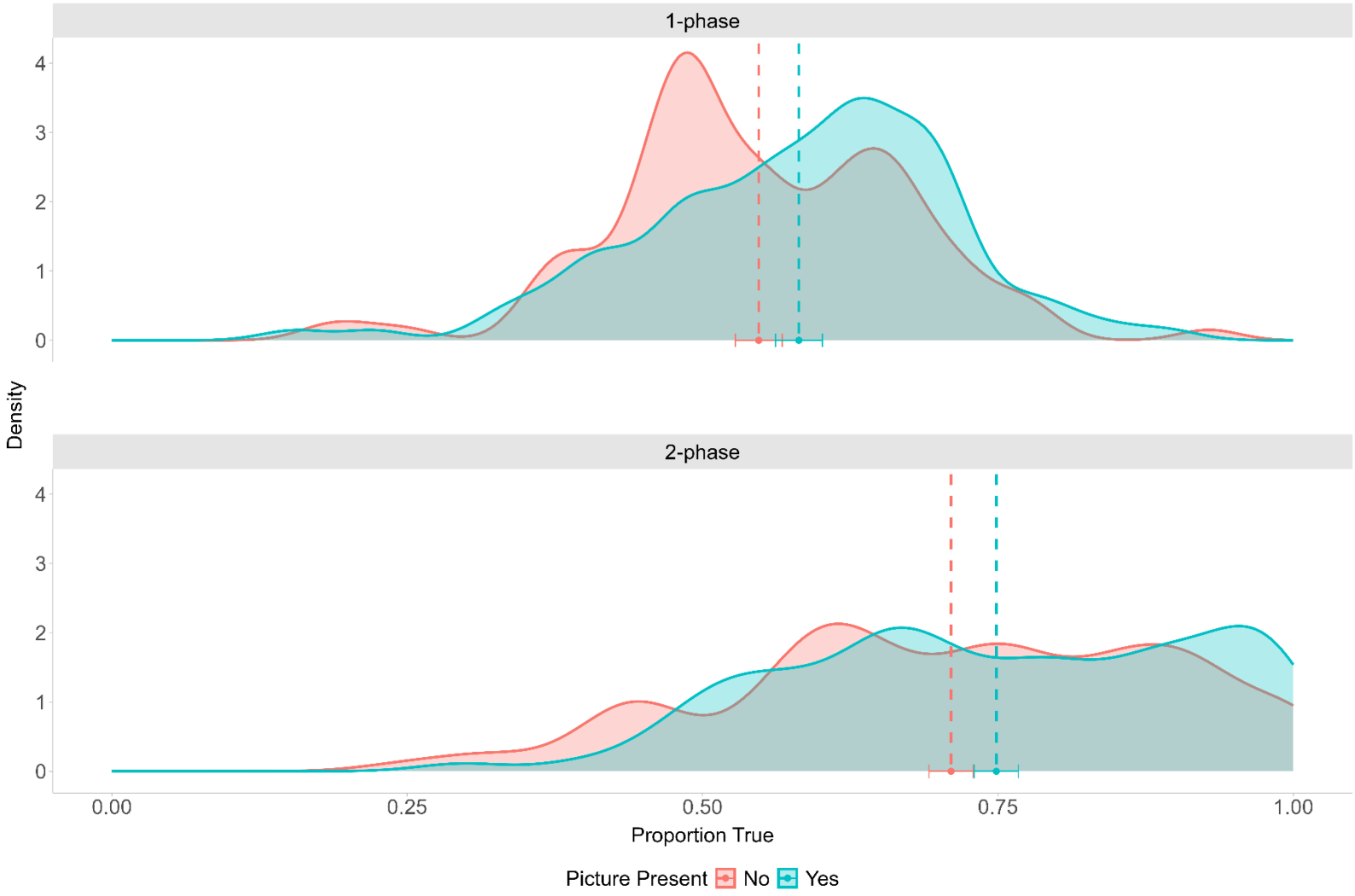
Results

A significant main effect of phase emerged, $F(1, 200) = 74.09$, $p < .001$, along with a significant main effect of photo, $F(1, 200) = 13.83$, $p < .001$. However, the interaction between phase and photo was not significant, $F(1, 200) = 0.05$, $p = .822$. Participants displayed a higher proportion of "true" responses in the 2-phase procedure ($M = 0.73$, 95% CI [.70, .75]) than in the 1-phase procedure ($M = 0.56$, 95% CI [.55, .58]) $d = 1.21$ 95% CI [0.89, 1.51], replicating the previous findings (see Figure 5 for details).

Additionally, participants exhibited a slightly higher proportion of true responses when the photo was present ($M = 0.66$, 95% CI [.65, .68]) compared to when the photo was absent ($M = 0.63$, 95% CI [.61, .64]), but the size of the difference was modest, $d = 0.26$, 95% CI [0.13,

0.40]. Although the interaction between photo and phase was non-significant, the magnitudes of the truthiness effect were compared between the 1-phase and 2-phase experiments. A closer examination of the truthiness effect itself showed significant differences between picture-present and picture-absent conditions in both the 1-phase condition, $t(102) = 2.40$, $p = .018$ and the 2-phase condition, $t(98) = 2.89$, $p = .005$. The 1-phase condition demonstrated a small effect size, $d = 0.24$ [0.04, 0.43] which closely resembled the effect size in the 2-phase condition, $d = 0.27$ [0.10, 0.43]. Figure 5 displays these results. Experiment 4's results conform with the mini-meta-analysis on Experiments 1, 2, and 3, in which there was a marginal, but non-significant difference in effect size between the phase conditions.

Figure 5. Kernel Density Plot of Proportion True when Picture Present/Absent in Experiment 4



Experiment 5

In Experiments 1 - 4, separating the presentation of claims and photos into two phases did not significantly enhance the truthiness effect compared to the traditional 1-phase presentation. While there may be a slight trend in this direction, any such effect is likely small. The source monitoring framework suggests that people are more susceptible to misattributions when the source of an unintended influence is less versus more salient. Despite the intention for the 2-phase design to reduce awareness of the photos as a potential source of influence, participants

may have recollected their phase 1 encounter when the claim reappeared in phase 2. During phase 1, subjects judged whether each claim was presented with a related photo, alone, or with an unrelated photo. This task required deep processing of the stimulus materials, potentially leading to conscious recollection of the phase 1 encounter with the photo during phase 2.

In Experiment 5, the 2-phase procedure was adjusted to reduce conscious recollection of phase 1 encounters during phase 2. Participants passively viewed half of the photos in phase 1 without claims or judgments. In phase 2, they judged claims as true or false without seeing the photos. The filler photos were not used. It was hypothesized that this method would induce a larger truthiness effect by indirectly enhancing the perceived truthfulness of a claim through memory of the related photos, without necessarily recollecting the encounter during the judgment.

Method

The participants were 277 undergraduate psychology students from the University of Victoria. After applying pre-registered exclusion criteria, the final sample consisted of 275 participants (1-phase: N =138, 2-phase: N = 137). A 2 (photo: present, absent) x 2 (phase: 1-phase, 2-phase) mixed design was used, with photo manipulated within subjects and phase between subjects.

To reduce error variance, participants completed the experiment in small, supervised groups in a computer lab using PsychoPy software. The stimulus materials were identical to those used in Experiment 4, as was the procedure used in the 1-phase condition, in which 56 claims were presented sequentially: 28 with a related photo, 28 with no photo. The assignment of items to conditions and the order of presentation were randomized anew for each participant.

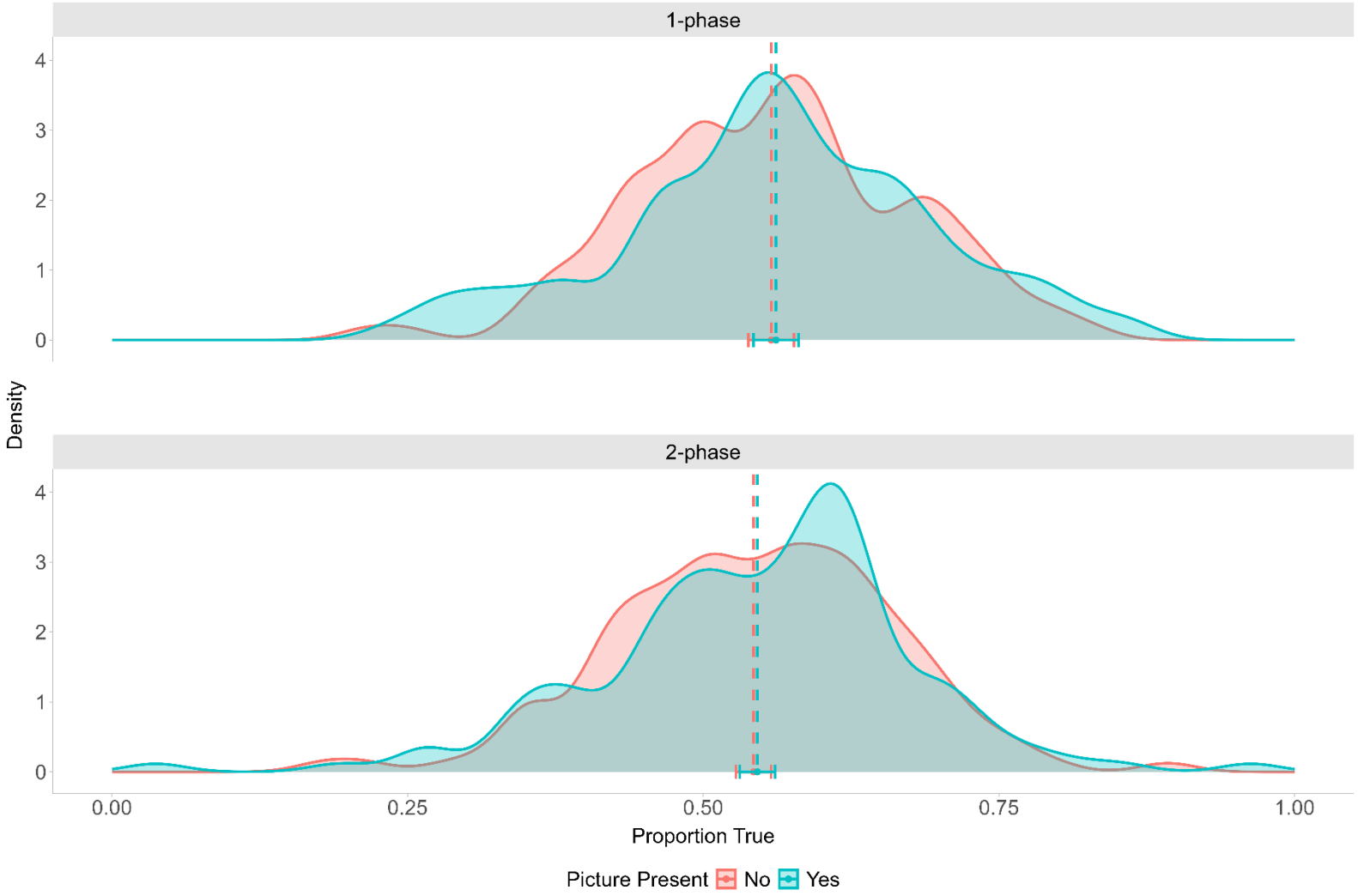
Each item remained on the screen until the participant indicated whether the claim was true or false.

In the 2-phase condition, participants viewed 28 photos sequentially for a minimum of 2 seconds each, with the option to extend viewing time indefinitely. Once at least 2 seconds had passed, pressing the spacebar caused the photo to disappear and be replaced by the next image. After viewing all 28 photos, participants completed the cognitive distraction task. Subsequently, each photo-less claim was displayed sequentially, and participants judged each to be either true or false.

Results

No significant main effect of phase was observed, $F(1, 273) = 1.160$, $p = .282$, nor was there a significant main effect of photo, $F(1, 273) = 1.571$, $p = .211$. The interaction between phase and photo was also non-significant, $F(1, 273) = 0.819$, $p = .366$. Truth judgments were comparable in the two groups of participants, with a mean of .56 (95% CI [.54, .57]) in the 2-phase procedure compared to a mean of .54 (95% CI [.53, .56]) in the 1-phase procedure, $d = 0.08$, 95% CI [-.04, .19]. Participants exhibited no significant difference in proportion of true responses when the photo was present ($M = 0.56$, 95% CI [.54, .57]) compared to when the photo was absent ($M = 0.55$, 95% CI [.53, .56]), $d = .13$, 95% CI [-.11, .37]. Although the interaction between photo and phase was non-significant, the magnitudes of the truthiness effect between the 1-phase and 2-phase experiments was determined. The 1-phase condition yielded a negligible effect size, $d = 0.11$, 95% CI [-.04, 0.27]. This resembled the magnitude of the miniscule effect size in the 2-phase condition, $d = 0.03$, 95% CI [-0.14, 0.20]. Figure 6 displays these results.

Figure 6. Kernel Density Estimate Plot of Proportion True when Picture Present/Absent in Experiment 5



Experiment 6

The 1-phase condition in Experiment 5 was a direct replication of the 1-phase condition in Experiment 4 and a close replication of the 1-phase condition in Experiments 1, 2, and 3, with the primary distinction being that the earlier experiments employed blocked counterbalancing. However, unlike the first four experiments, Experiment 5 did not yield a statistically significant truthiness effect in the 1-phase condition. This outcome is likely attributable to a Type II error;

despite the use of carefully selected stimuli, a within-subjects design with 28 items per condition, and university student participants tested in a laboratory setting, small effects may not always reach statistical significance. The statistical power of this design is partially contingent on the correlation between the proportion of "true" responses for photo and no-photo items. Based on the data from Experiments 1 - 4, a reasonable estimate of that correlation is $r = .39$ (95% CI [.33, .45]) for the 1-phase condition and $r = .75$ (95% CI [.71, .78]) for the 2-phase condition. The higher correlation in the 2-phase condition suggests that photos exert a weaker, more uniform influence, leading to more consistent truth judgments across photo-present and photo-absent items. In contrast, the lower correlation in the 1-phase condition likely reflects the stronger and more item-specific impact of immediately visible photos, increasing variability and reducing consistency in judgments. Across those four experiments a reasonable estimate of the size of the truthiness effect is $d = .21$ for the 1-phase condition and $d = .28$ for the 2-phase condition. Power simulations using those correlations and effect-size estimates were conducted, with an alpha of .05 (see osf.io/v3myg). The analyses indicated that 90% power to detect truthiness required a sample size of 255 for the 1-phase condition and 150 for the 2-phase condition. Given only 138 subjects were tested in the 1-phase condition of Experiment 5, under these assumptions power to detect truthiness in that experiment was less than 70%.

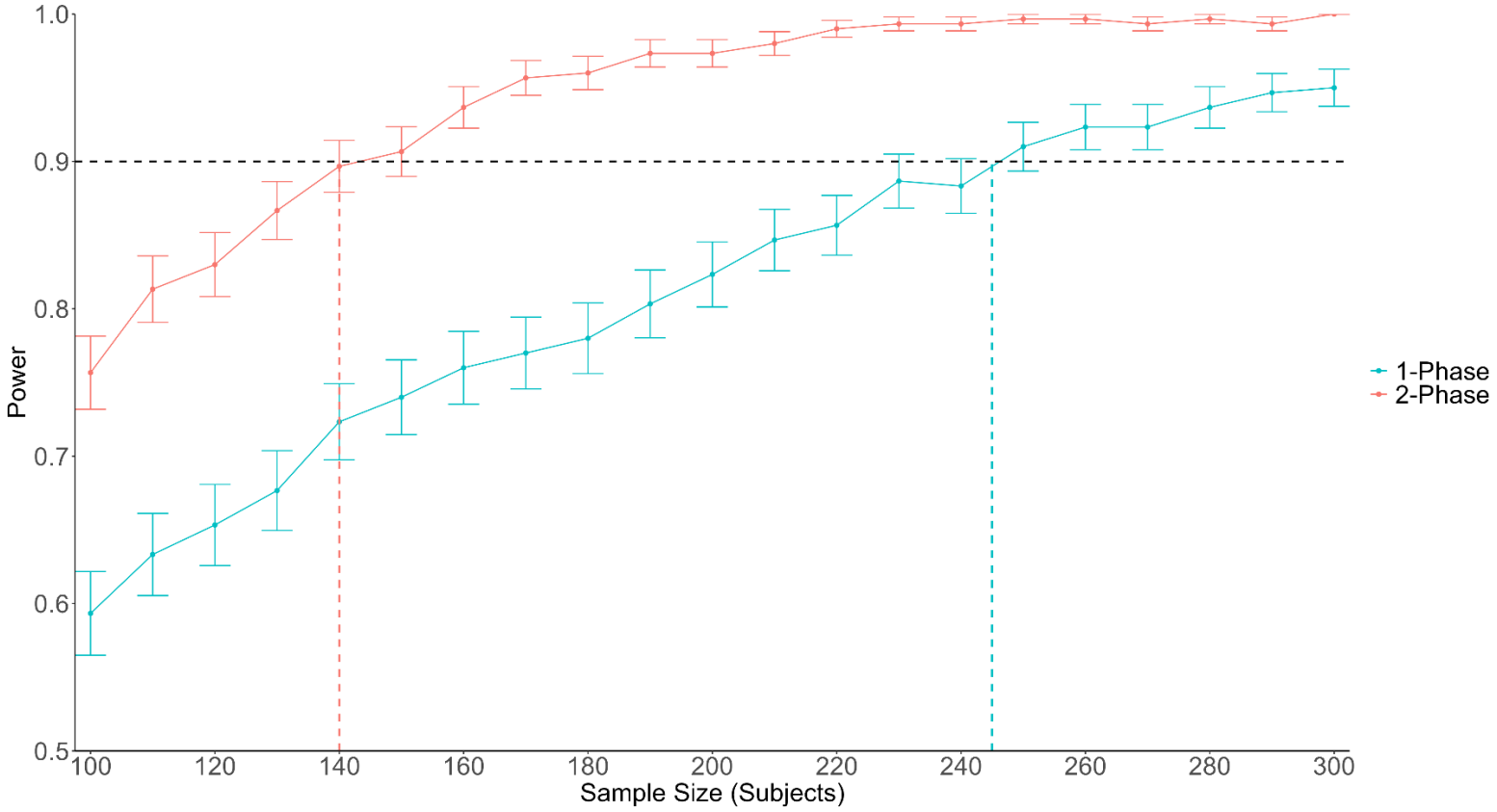
The power analyses reported above do not address the sample size required to achieve adequate power to detect a larger truthiness effect in the 2-phase condition relative to the 1-phase condition. Given the current effect size estimates, achieving .90 power to detect the interaction at $\alpha = .05$ would require a sample size in the thousands. If the goal was to detect a difference between the 1-phase and 2-phase conditions only when the latter produced at least a 25% increase in the truthiness effect (e.g., $d = .20$ in the 1-phase condition and $d = .25$ in the 2-phase

condition), the power analysis indicated that, again, thousands of participants per group would be required to achieve 90% power to detect the two-way interaction (see Figure 7). Given the substantial time and financial costs associated with such a large sample, it was determined instead to recruit as many participants as possible during the Spring semester using UVic's Psychology Research Participation System. Participants completed the study online at their convenience, as prior analyses suggest that in-lab testing did not substantially reduce error variance.

One motivation for Experiment 6 was to make a final attempt to detect the predicted superiority of the 2-phase procedure in generating truthiness. The effect was presumed to be genuine but small and accompanied by substantial variability. Another motivation was that Experiment 5 yielded inconclusive results in the 1-phase condition.

A simulation power analysis using data from Experiments 1–4 indicated that a substantially larger sample size (N = 180) was necessary to achieve 90% power for the main effect of photo (N = 245 for the 1-phase, N = 140 for the 2-phase; code available on osf.io/v3myg). Assuming equal sample sizes in both phase conditions, approximately 245 participants per condition would have been required (see Figure 7 for details). While achieving this target appeared feasible, the approach used instead focused on recruiting as many participants as possible throughout the fall semester rather than adhering to a fixed number.

Figure 7. Simulation Based Power Curves for Truthiness Effect in the 1-Phase and 2-Phase Conditions



In the 2-phase condition of Experiment 5, subjects merely viewed photos in phase 1 and then judged the truth of claims (half of which were related to the previously viewed photos) in phase 2. It was speculated that, at times, a phase 2 claim might evoke memories of a related phase 1 photo, and that such automatic recruitment could contribute to the fluent processing of the claim and/or the fluent generation of reasons it might be true, thereby generating a truthiness effect. However, the findings provided no hint that this occurred. Far from producing a large truthiness effect, exposure to related photos under these conditions appears to have had no effect on truth judgments

Although Experiments 1-4 showed a modest truthiness effect in both the 1-phase and 2-phase conditions, they failed to provide strong evidence that separating photo exposure and truth

judgments reliably enhanced the effect. One possible limitation was that participants in the 2-phase condition were required to explicitly categorize each claim as accompanied by a related photo, unrelated photo, or no photo during phase 1. This task may have encouraged deep, deliberate processing of the photo-statement pairings, making participants more aware of the photos' presence and encouraging discounting of the photo's influence at the time of judgment. If participants recognized the experimental manipulation, they may have adjusted their judgments accordingly, thereby muting any potential increase in truthiness due to temporal separation.

In contrast, Experiment 5 attempted to minimize discounting by presenting photos alone in phase 1, without associated claims. However, this modification appeared to sever the associative link between the photo and the claim too strongly, resulting in no detectable truthiness effect. Thus, neither highly explicit photo-claim pairing (Experiments 1–4) nor passive photo exposure without claims (Experiment 5) produced a reliably larger truthiness effect under the 2-phase design.

Given these prior findings, Experiment 6 was designed to strike a balance between these two approaches. Participants in the 2-phase condition read claims that were sometimes accompanied by photos but were not asked to make any explicit categorization judgments. This procedure was intended to create an incidental association between claims and photos strong enough to influence later truth judgments, while minimizing awareness of the manipulation and reducing opportunities for participants to discount the influence of photos. If discounting processes were indeed limiting the size of the truthiness effect in previous experiments, this weaker associative encoding without explicit categorization should produce a stronger, more consistent truthiness effect in the 2-phase condition compared to the 1-phase condition.

Additionally, Experiment 6 provided a necessary replication of the standard 1-phase procedure, given the null result observed in Experiment 5. By implementing a design that preserved associative encoding while minimizing discounting, Experiment 6 tested whether the hypothesized superiority of the 2-phase procedure could be demonstrated.

Method

A total of 275 participants were included after applying exclusion criteria (1-phase: N = 143; 2-phase: N = 132). A 2 (photo: present, absent) x 2 (phase: 1-phase, 2-phase) mixed design was used, with photo manipulated within subjects and phase between subjects. Supervised in-person completion of the prior experiments did not reduce error variance; therefore, all participants were students from the University of Victoria who completed the experiment remotely on their own devices at their convenience.

Results

A significant main effect of phase emerged, $F(1, 273) = 91.12$, $p < .001$, along with a significant main effect of photo, $F(1, 273) = 21.11$, $p < .001$. However, the interaction between phase and photo was not significant, $F(1, 273) = 0.50$, $p = .480$. Participants displayed a higher proportion of "true" responses in the 2-phase procedure ($M = 0.74$, 95% CI [.72, .76]) than in the 1-phase procedure ($M = 0.56$, 95% CI [.54, .58]) $d = 1.02$, 95% CI [0.83, 1.24], replicating the previous findings (see Figure 8 for details).

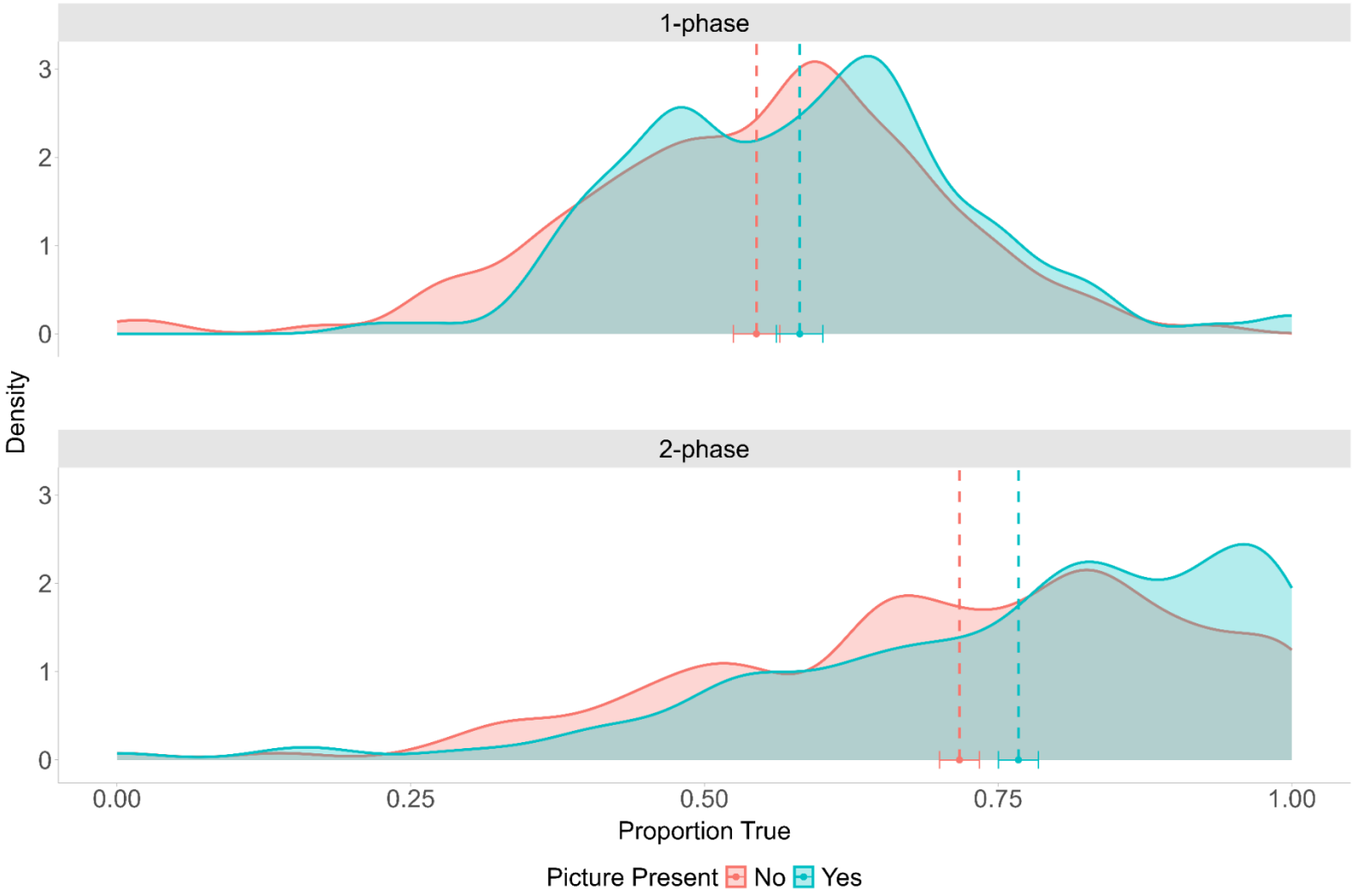
Additionally, participants exhibited a slightly higher proportion of true responses when the photo was present ($M = 0.67$, 95% CI [.65, .69]) compared to when the photo was absent ($M = 0.63$, 95% CI [.61, .64]), but the size of the difference was modest, $d = 0.28$, 95% CI [0.17,

0.39]. Although the interaction between photo and phase was non-significant, the magnitudes of the truthiness effect were compared between the 1-phase and 2-phase experiments. A closer examination of the truthiness effect revealed significant differences between the picture-present (M = 0.58, 95% CI [0.55, 0.61]) and picture-absent (M = 0.54, 95% CI [0.51, 0.57]) conditions in the 1-phase procedure, $t(142) = 2.60$, $p = .010$. Similarly, in the 2-phase procedure, participants exhibited higher truth ratings in the picture-present condition (M = 0.76, 95% CI [0.73, 0.79]) than in the picture-absent condition (M = 0.71, 95% CI [0.68, 0.74]), $t(131) = 4.11$, $p < .001$.

The 1-phase condition demonstrated a small effect size, d = 0.22 [0.07, 0.37] which was directionally lower than the effect size in the 2-phase condition, d = 0.36 [0.20, 0.51], though not significantly so, $t(273) = 0.71$, $p = .480$. Experiment 6's results conform with the results from the previous experiments in which there was a marginal, but non-significant, difference in effect size between the phase conditions.

These findings indicate that the 2-phase condition consistently elicited a greater proportion of "true" responses compared to the 1-phase condition, and the presence of an image had a small but significant effect on truth judgments in both phases. The absence of an interaction effect suggests that, like prior experiments, this image-related increase in truth responses was not moderated by phase condition. However, Experiment 6 showed large ceiling effects in the 2-phase condition, possibly reducing the size of the truthiness effect. Figure 8 displays these results.

Figure 8. Kernel Density Estimate Plot of Proportion True in Experiment 6 when Picture Present/Absent



Item Analyses

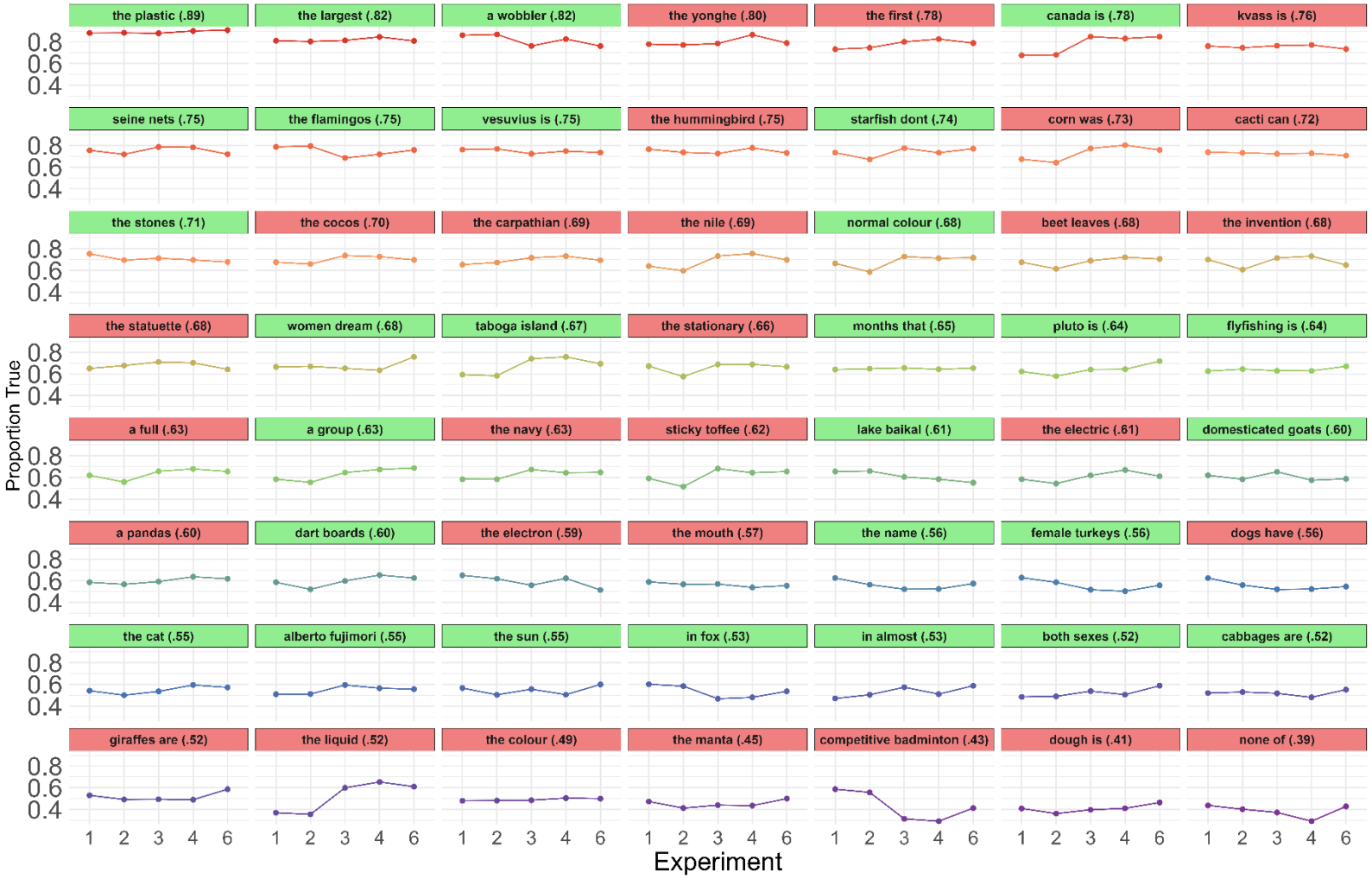
A critical aspect of truthiness research is understanding item effects - whether certain items are consistently judged as true or false and how they interact with experimental manipulations. Moreover, variations in item susceptibility to experimental manipulations, such as the presence of a photo, provide insight into the underlying cognitive mechanisms of belief formation.

A novel contribution of this research is the extensive analysis of item effects using data from multiple experiments. Item analyses were conducted using data from Experiments 1-4 and 6 in an exploratory spirit to address two major questions: (1) Are some items more often judged true than others? and (2) Are some items more influenced by the presence of a photo than others? Because the 2-phase procedure in Experiment 5 was qualitatively different from the earlier experiments and did not produce the expected truthiness effect in either the 1-phase or 2-phase conditions, the data from that experiment were not included in these analyses.

Item Analyses: Descriptive Results

Figures 9 and 10 present item-level analyses of the proportion of responses in which items were judged as true across experiments. Figure 9 illustrates that some items were consistently judged as true, others as false, while many items were approximately equally judged true or false. With few exceptions, the proportion of "true" responses for any given item remained stable across the experiments. The scatterplots in Figure 11 further highlight this consistency by depicting the correlation across pairs of experiments, averaged across the photo-present and photo-absent conditions; the intraclass correlation coefficient (ICC 2,1) was high, $ICC = .82$, 95% CI [.74, .88], $F(55, 220) = 25$, $p < .001$. These results suggest that item effects for the proportion judged as “True” are relatively stable.

Figure 9. Proportion of "True" Responses by Item, Averaged Across Photo/Phase Conditions, and Across Experiments, Sorted by Highest to Lowest Proportion "True"



Note: A green title indicates that the item is true, while a red title signifies that the item is false. The numbers in parentheses represent the proportion judged true. Colour of the plotted line ranges from red (largest proportion true) through the spectrum to violet (smallest proportion true).

Figure 10. Proportion "True" by Item Faceted by Experiment and Photo Present/Absent and Collapsed Across 1- and 2-Phase Conditions

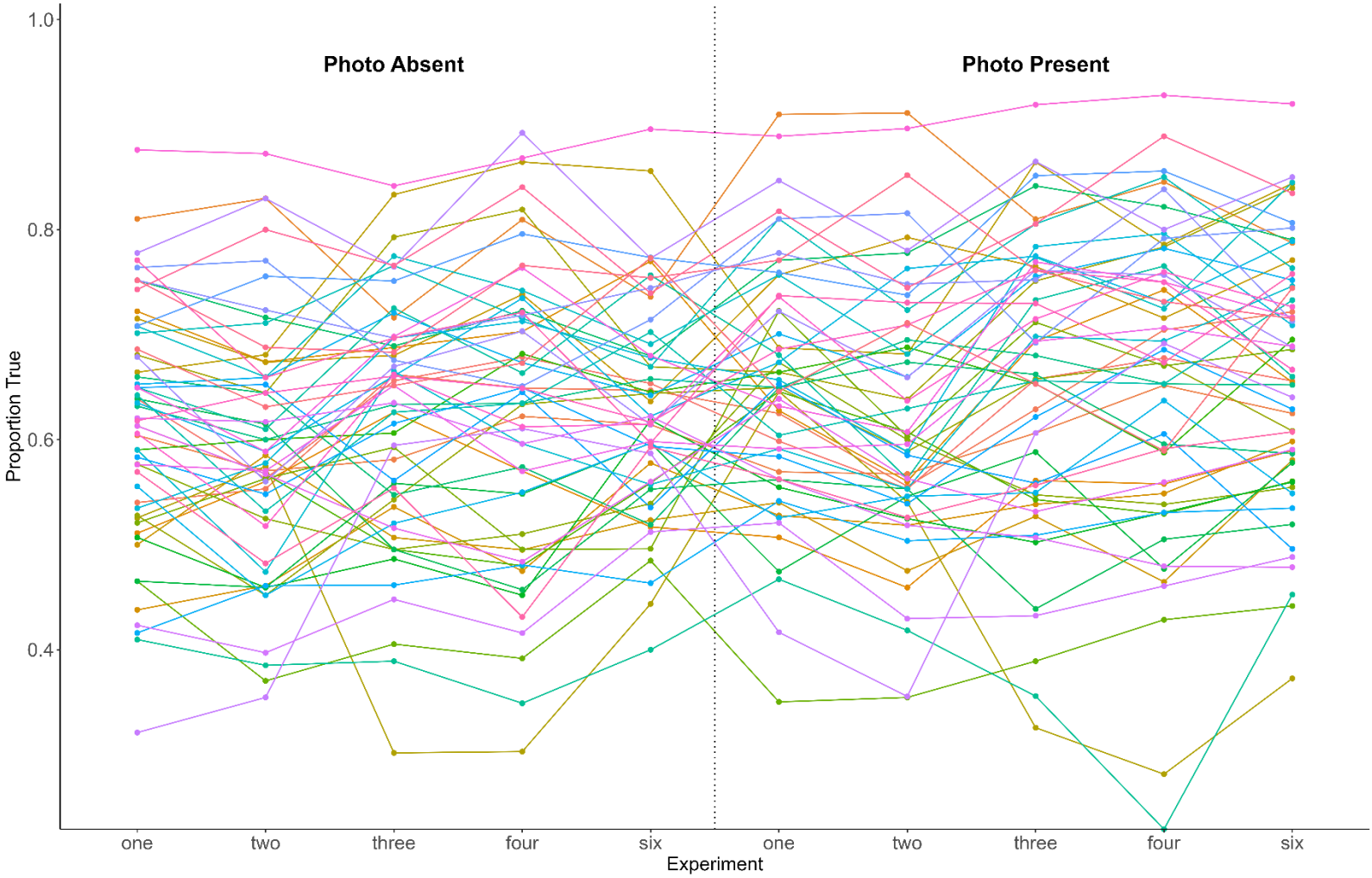
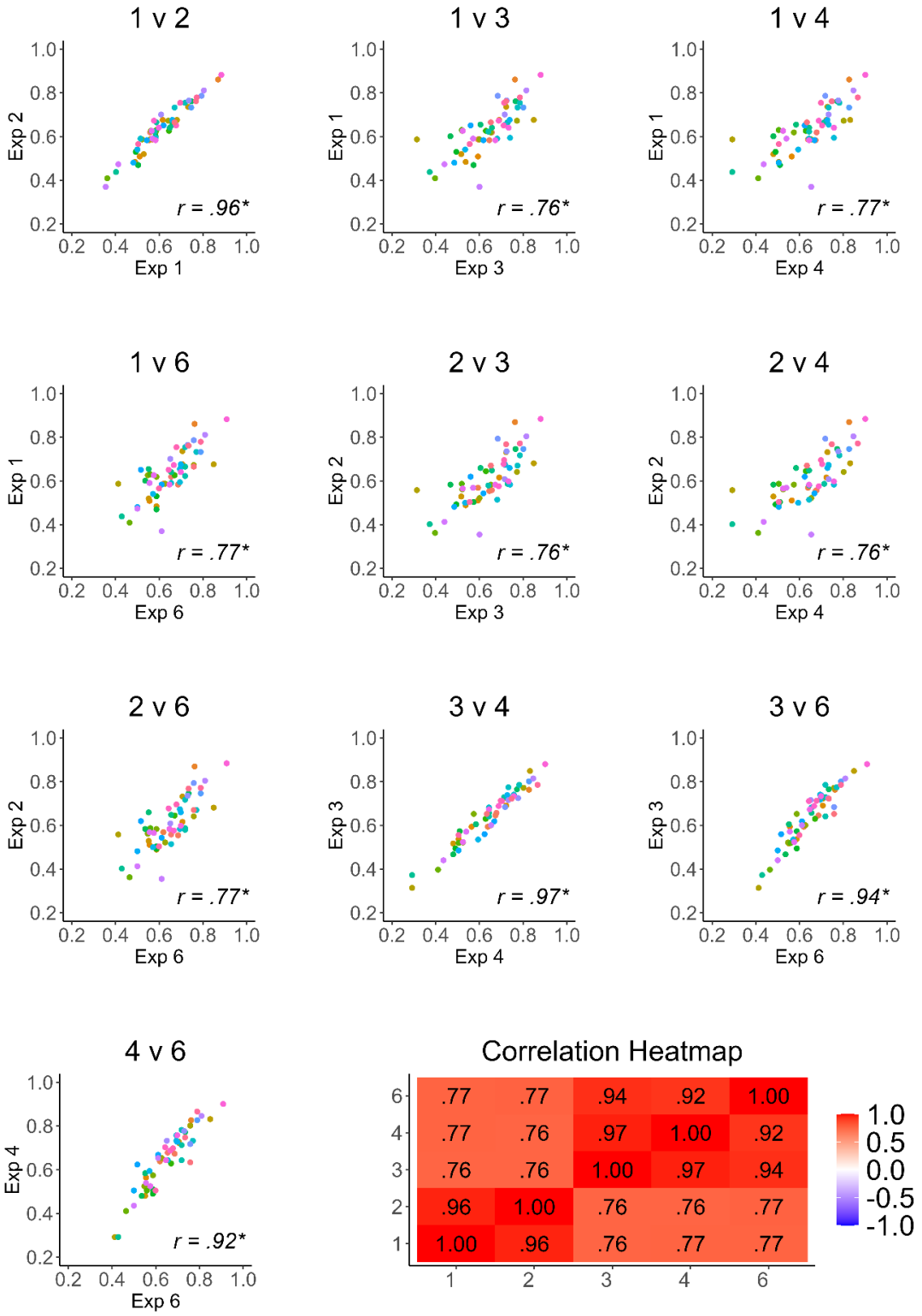


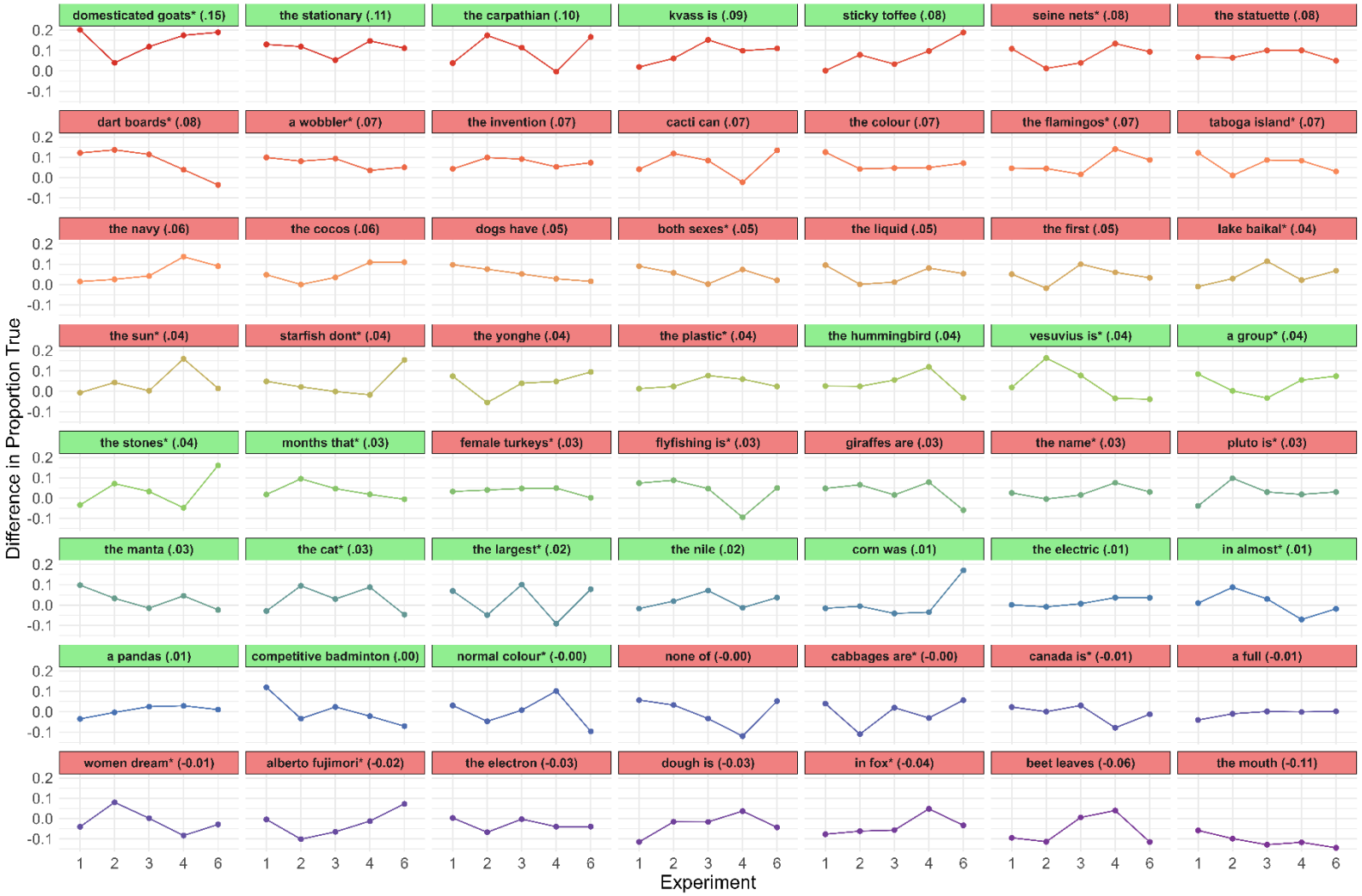
Figure 11. Scatterplot of Each Item Comparing the Five Experiments by Proportion 'True' Collapsed Across Photo and No-Photo Conditions, with Correlation Heatmap



Note: Colours are arbitrary, but colour-item pairings are consistent across plots.

Figures 12-15 illustrate the truthiness effect, defined as the difference in the proportion of items judged as true depending on whether a photo was present or absent. Figure 12, akin to Figure 9, displays the truthiness effect for each item across different experiments, revealing greater variability in the truthiness effect compared to the overall proportion judged true. The scatterplot in Figure 14 presents the correlations of the truthiness effect across experiments, revealing lower correlations than those depicted in Figure 11; the intraclass correlation coefficient (ICC 2,1) was low, $ICC = .28$, 95% CI [.17, .42], $F(55, 220) = 3$, $p < .001$. The modest ICC for truthiness effects may reflect that most items produced only a small effect, rendering them susceptible to random fluctuations across experiments and reducing the apparent stability of the effect. Additionally, variability in participants' susceptibility to photo influence may have contributed to the lower consistency observed across items.

Figure 12. Truthiness Effect Across Multiple Experiments by Item Sorted by Size of Truthiness Effect, Collapsed Across 1- and 2-Phase Conditions



Note: A green title indicates that the item is true, while a red title signifies that the item is false. The numbers in parentheses represent the difference between the photo present and photo absent conditions (i.e., truthiness effect). Colour of the plotted line ranges from red (largest truthiness effect) through the spectrum to violet (smallest truthiness).

Figure 13. Truthiness Effect of Each Item Across the Four Experiments, Collapsed Across 1- and 2-Phase Conditions

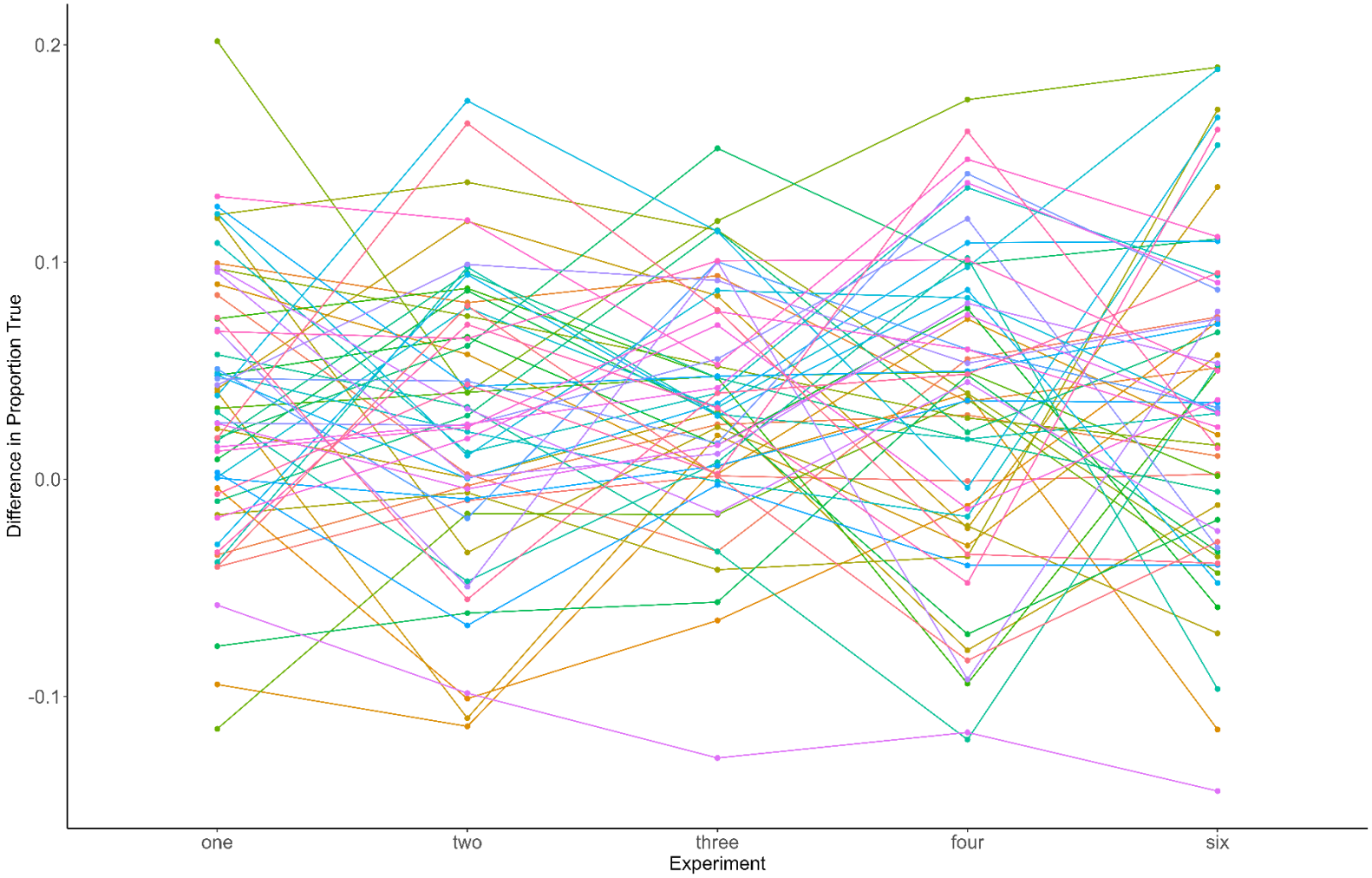
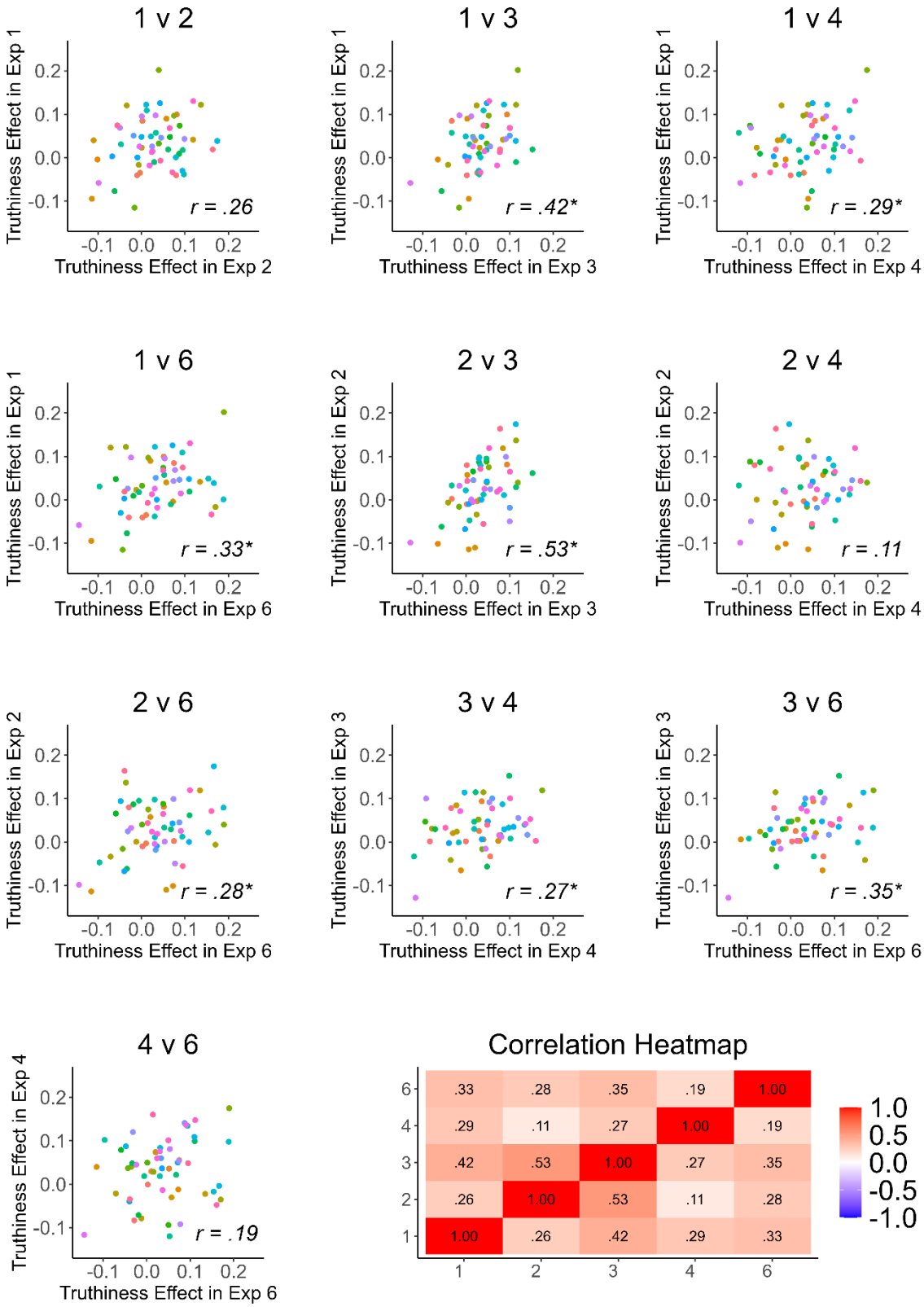


Figure 14. Scatterplot of Items Comparing the Four Experiments by Truthiness Effect, Collapsed Across 1- and 2-Phase Conditions, with Correlation Heatmap



Figures 15–19 display truthiness and falsiness effects of items by experiment. Figure 20 shows these effects averaged across experiments, sorted from those that produced the largest average truthiness effect to those that produced the largest reversal (i.e., more often judged "False" when presented with a photo). There was reasonable stability in the size of the truthiness effect for most of the items. Some items produced larger truthiness effects than others, and some were at least directionally reversed. There were far more items with positive truthiness effects than with no difference or falsiness effects. There was no obvious relationship between size of truthiness effect and actual truth of the statement.

The overall message is that some items produced larger truthiness effects than others with some consistency across experiments, but that consistency was far from perfect (and in some comparisons the correlation fell short of statistical significance). For example, with or without a picture the item about warblers was usually endorsed as true, and the item about dough was usually rejected as false. Regardless, there were a substantially greater number of items for which “true” ratings were at least directionally greater when the item was presented with a picture.

Figure 20 illustrates that the proportion of items judged as true and overall truthiness was comparable between the 1-phase and 2-phase conditions. However, the 1-phase condition appeared to have produced slightly stronger truthiness effects, along with a higher number of instances where the "True" response rate was lower for claims presented with a photo compared to those without. Of course, if participants were merely guessing, then occurrences of higher "true" response rates in the absence of a photo could be attributed to random variation rather than a true effect. However, upon close examination it was observed that certain items consistently appeared among those with the strongest reversals across experiments. That suggests that these

reversals may not be random but instead indicative of a meaningful pattern. To explore this further, the top five items across experiments that demonstrated this reversal effect most prominently were identified and considered (see Figure 23).

Figure 15. Mean Proportion "True" For Each Item when Presented With (Blue) Versus Without (Red) a Photo (Ordered by Size of the Difference and Collapsed Across 1- and 2-Phase Conditions) - Experiment 1

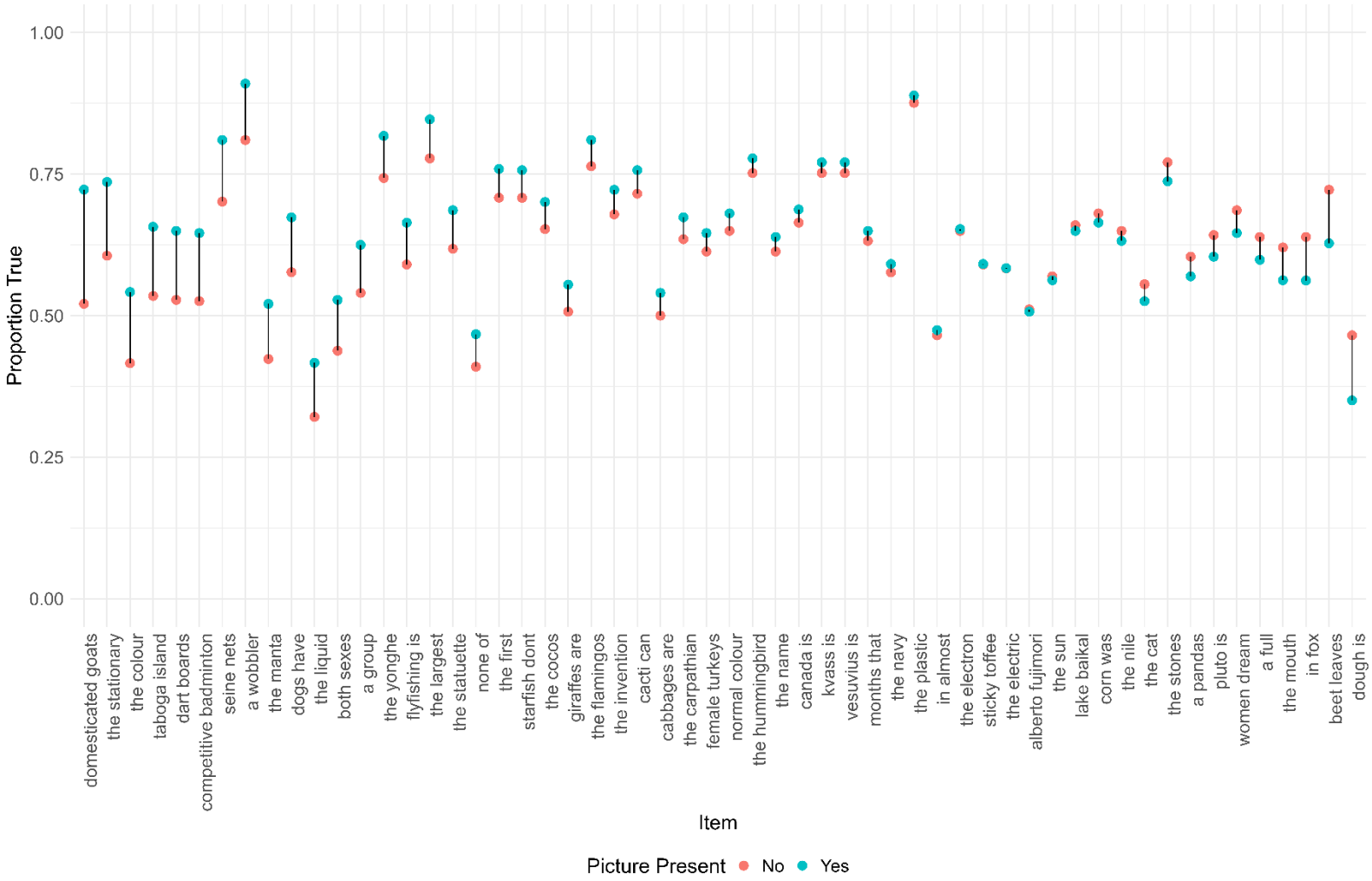


Figure 16. Mean Proportion "True" For Each Item when Presented With (Blue) Versus Without (Red) a Photo (Ordered by Size of the Difference and Collapsed Across 1- and 2-Phase Conditions) - Experiment 2.

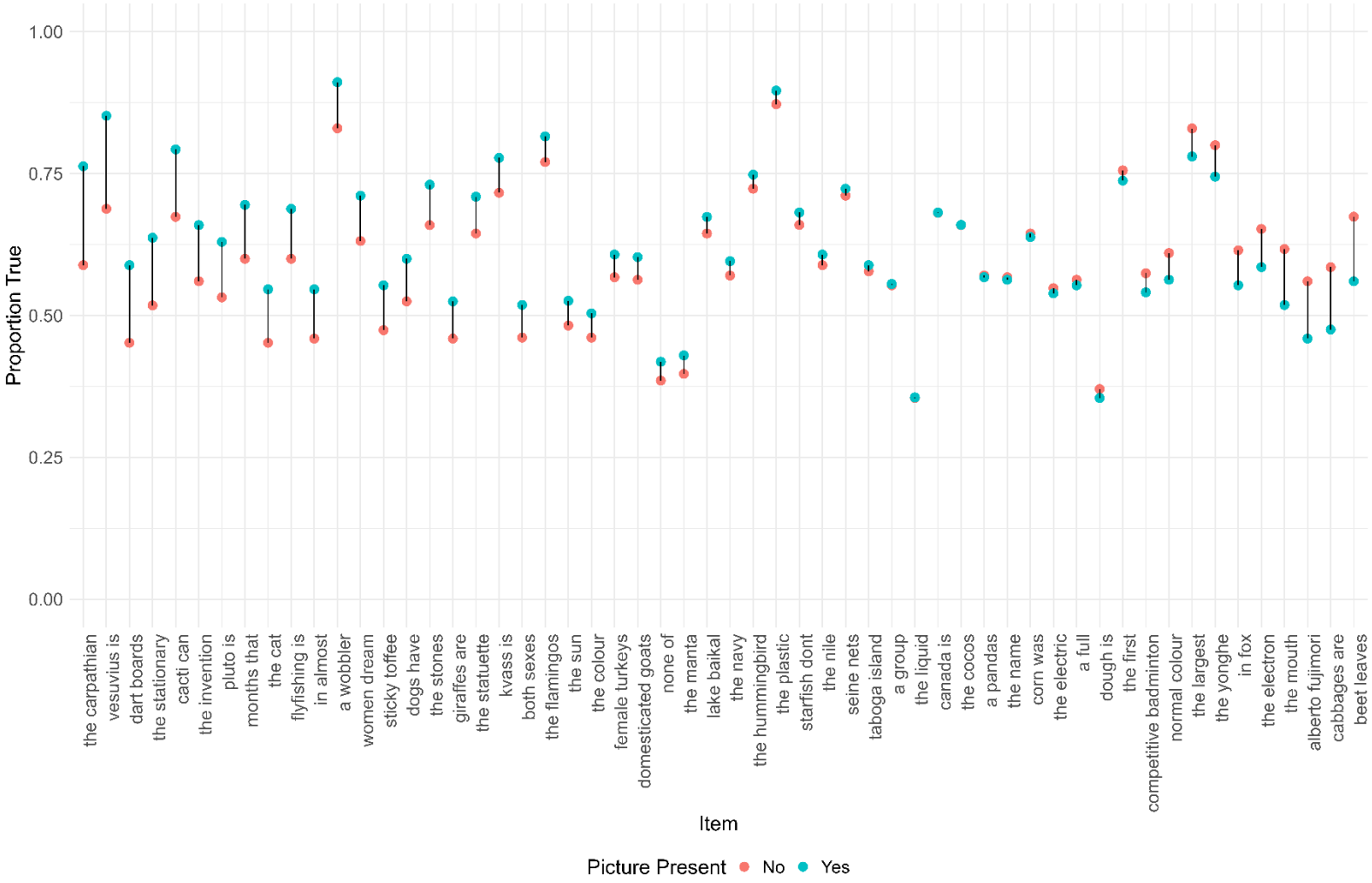


Figure 17. Mean Proportion "True" For Each Item when Presented With (Blue) Versus Without (Red) a Photo (Ordered by Size of the Difference and Collapsed Across 1- and 2-Phase Conditions) - Experiment 3

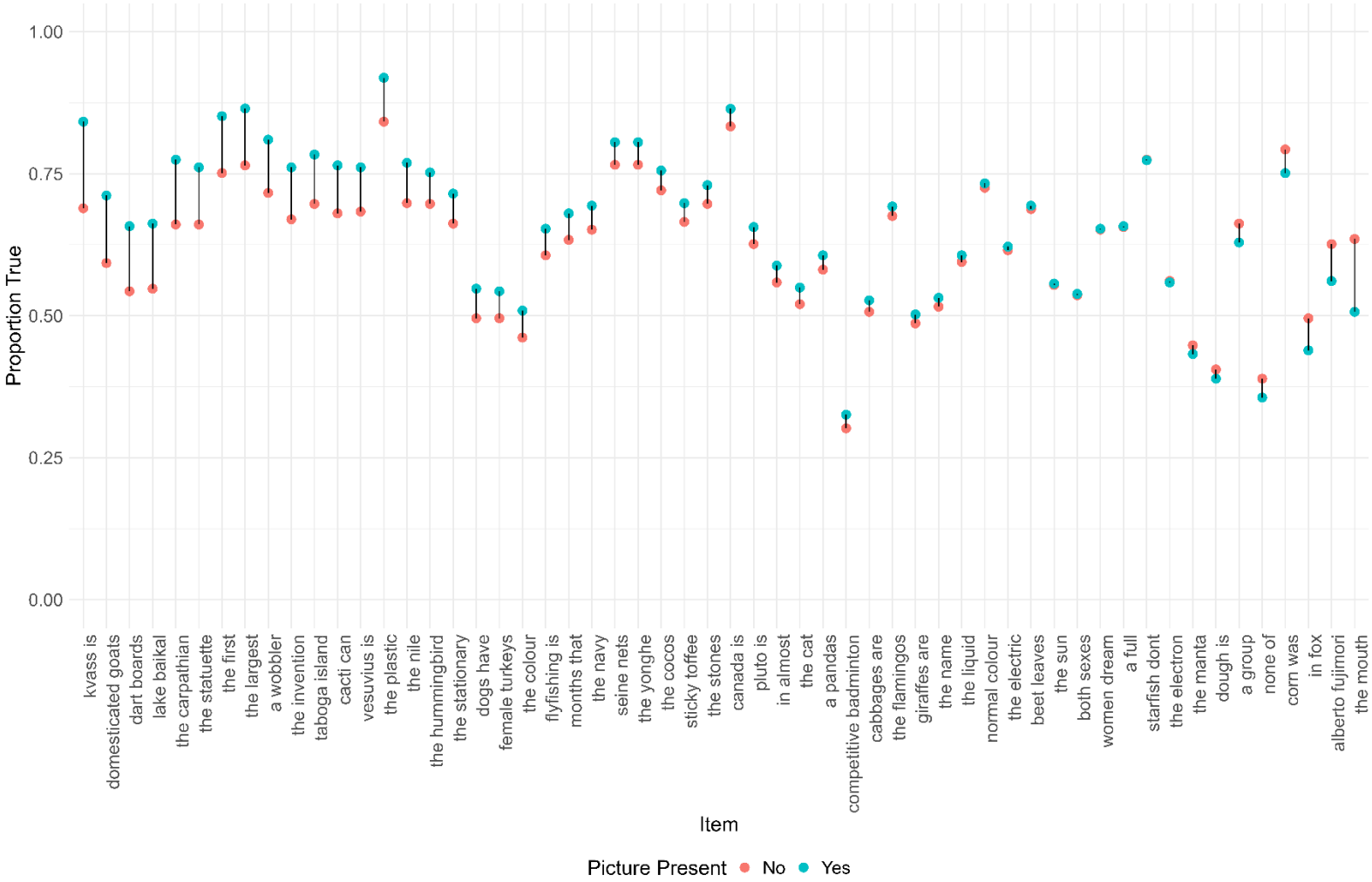


Figure 18. Mean Proportion "True" For Each Item when Presented With (Blue) Versus Without (Red) a Photo (Ordered by Size of the Difference and Collapsed Across 1- and 2-Phase Conditions) - Experiment 4

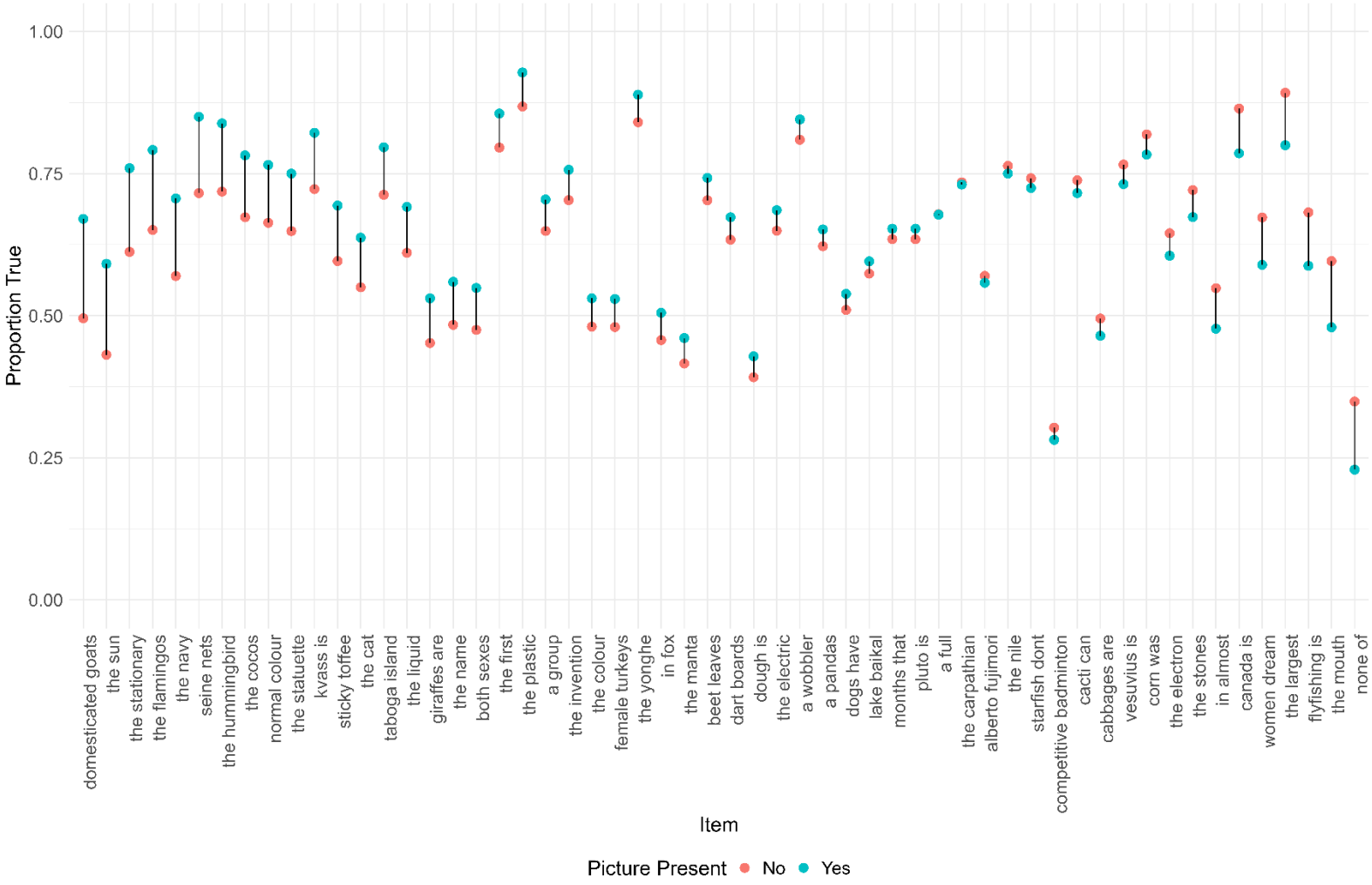


Figure 19. Mean Proportion "True" For Each Item when Presented With (Blue) Versus Without (Red) a Photo (Ordered by Size of the Difference and Collapsed Across 1- and 2-Phase Conditions) - Experiment 6

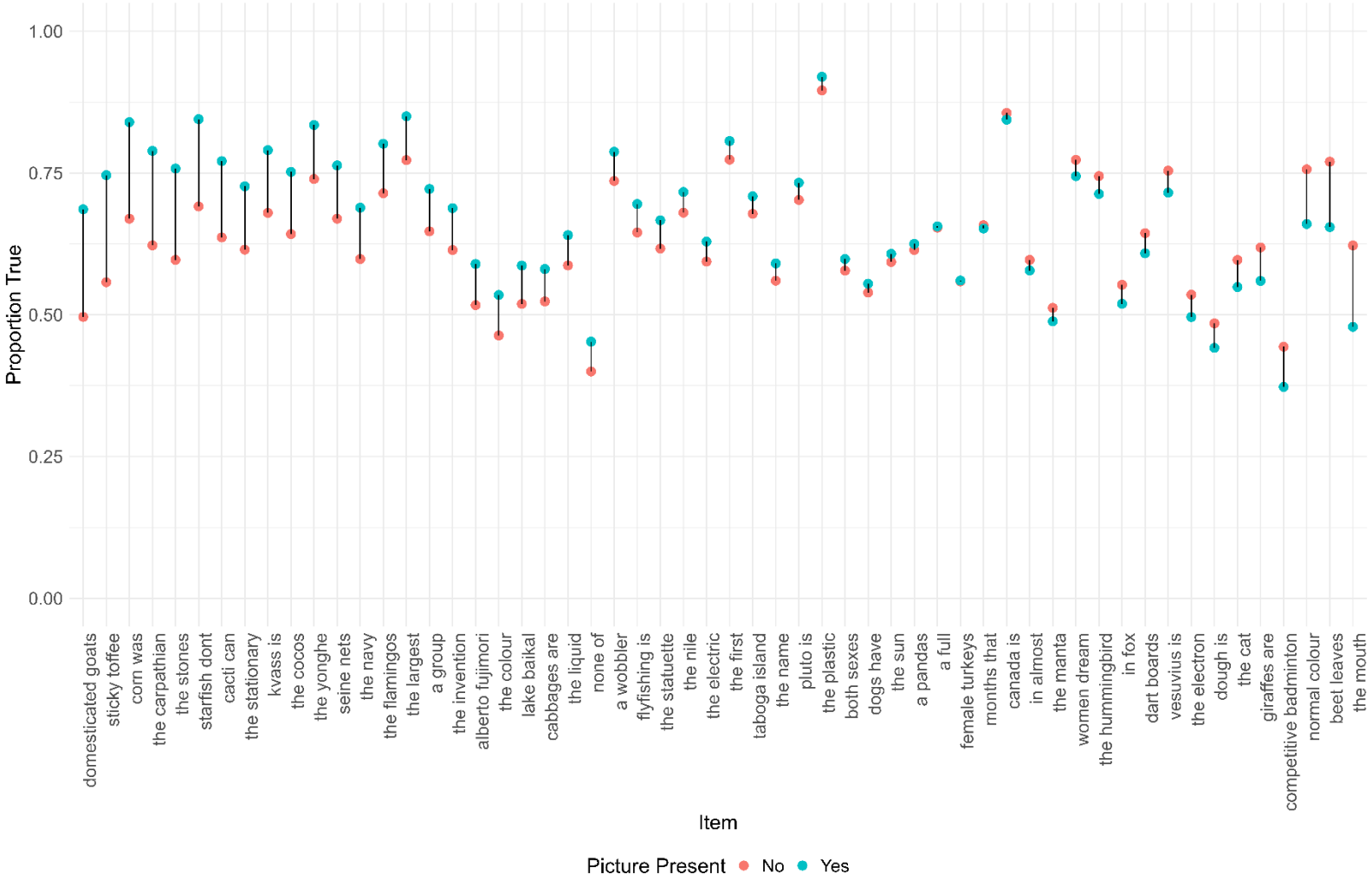
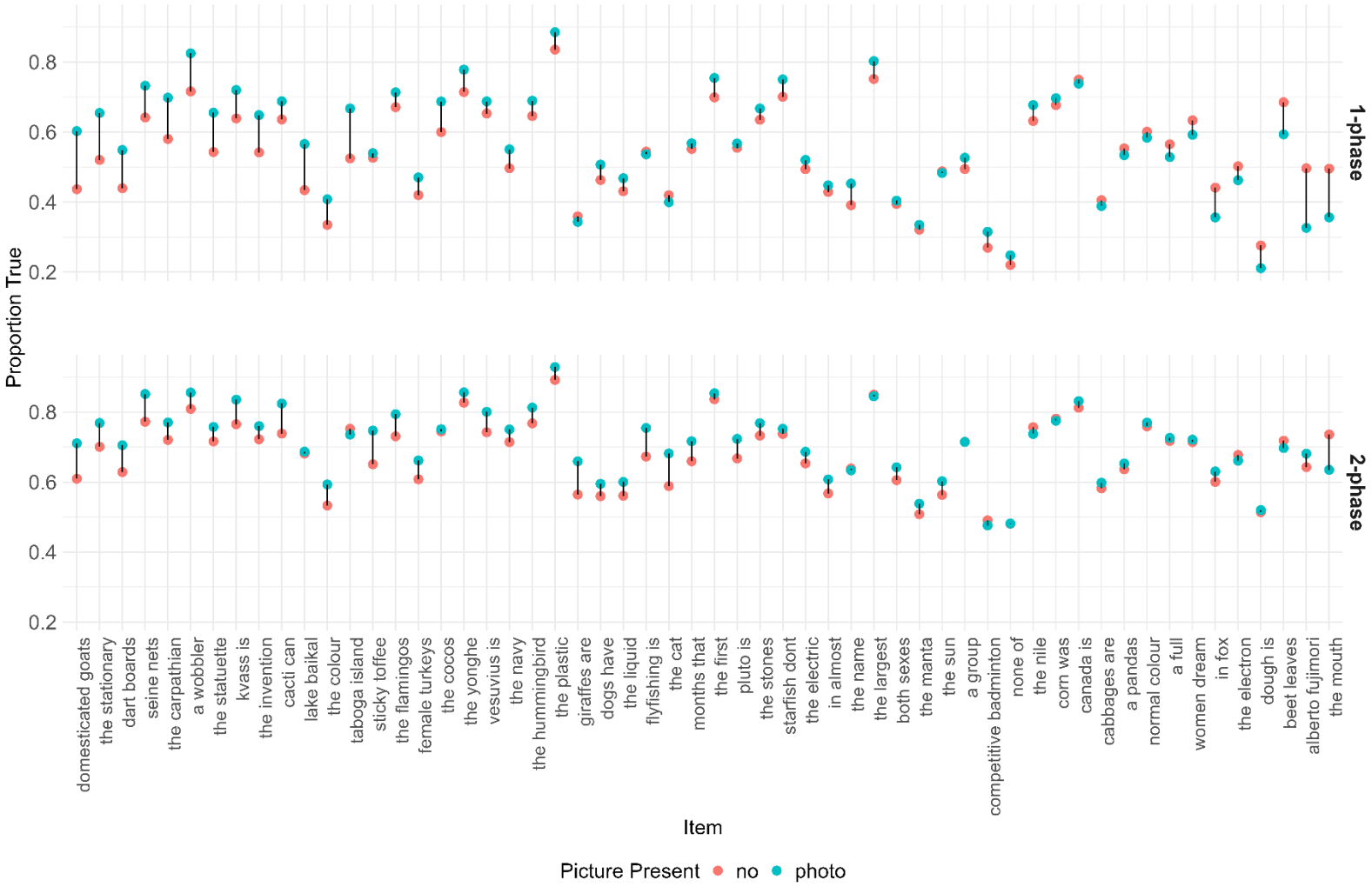
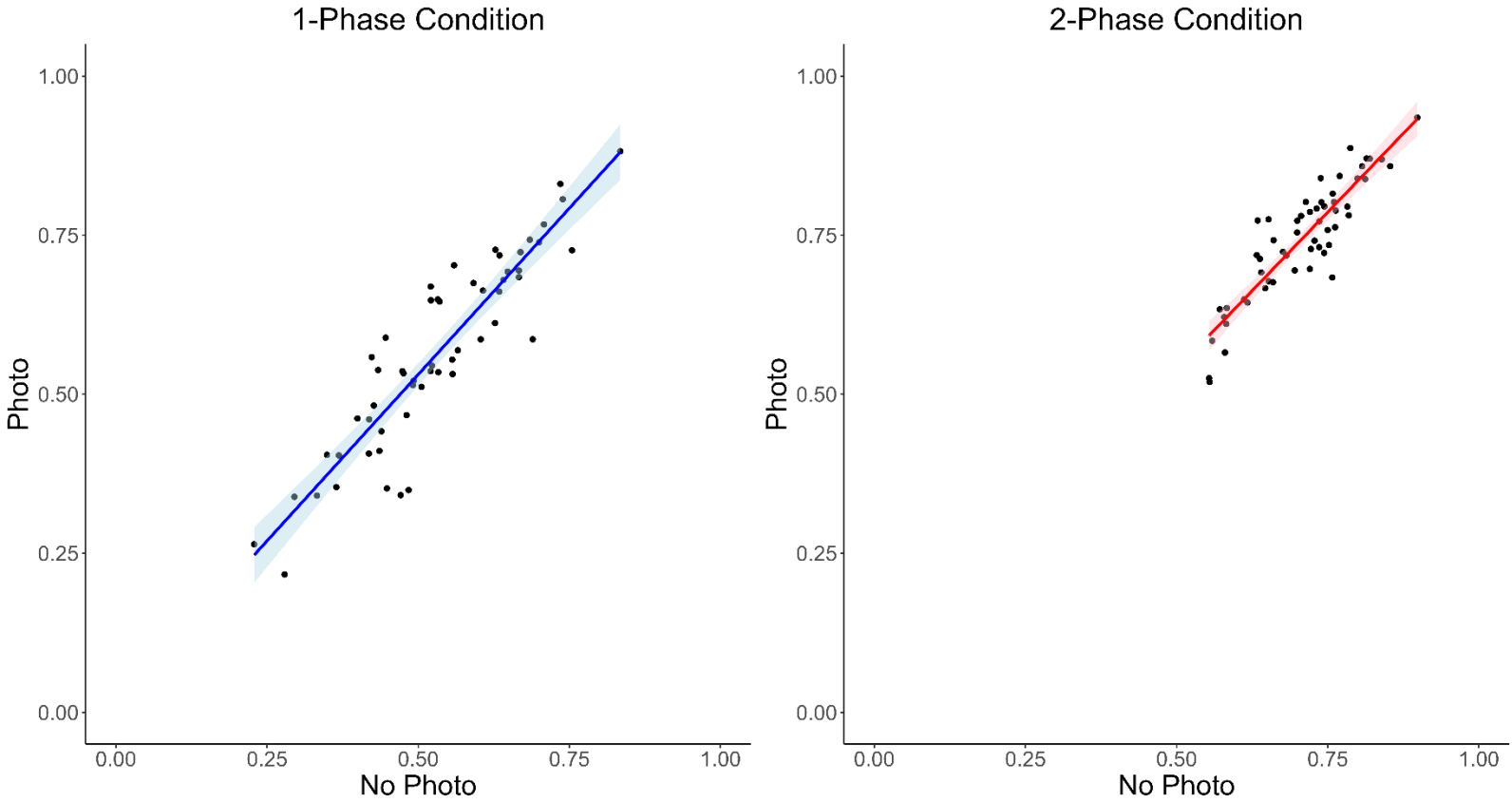


Figure 20. Mean Proportion "True" For Each Item when Presented With (Blue) Versus Without (Red) a Photo (Ordered by Size of the Difference and Collapsed Across Phases) - Combined Experiments



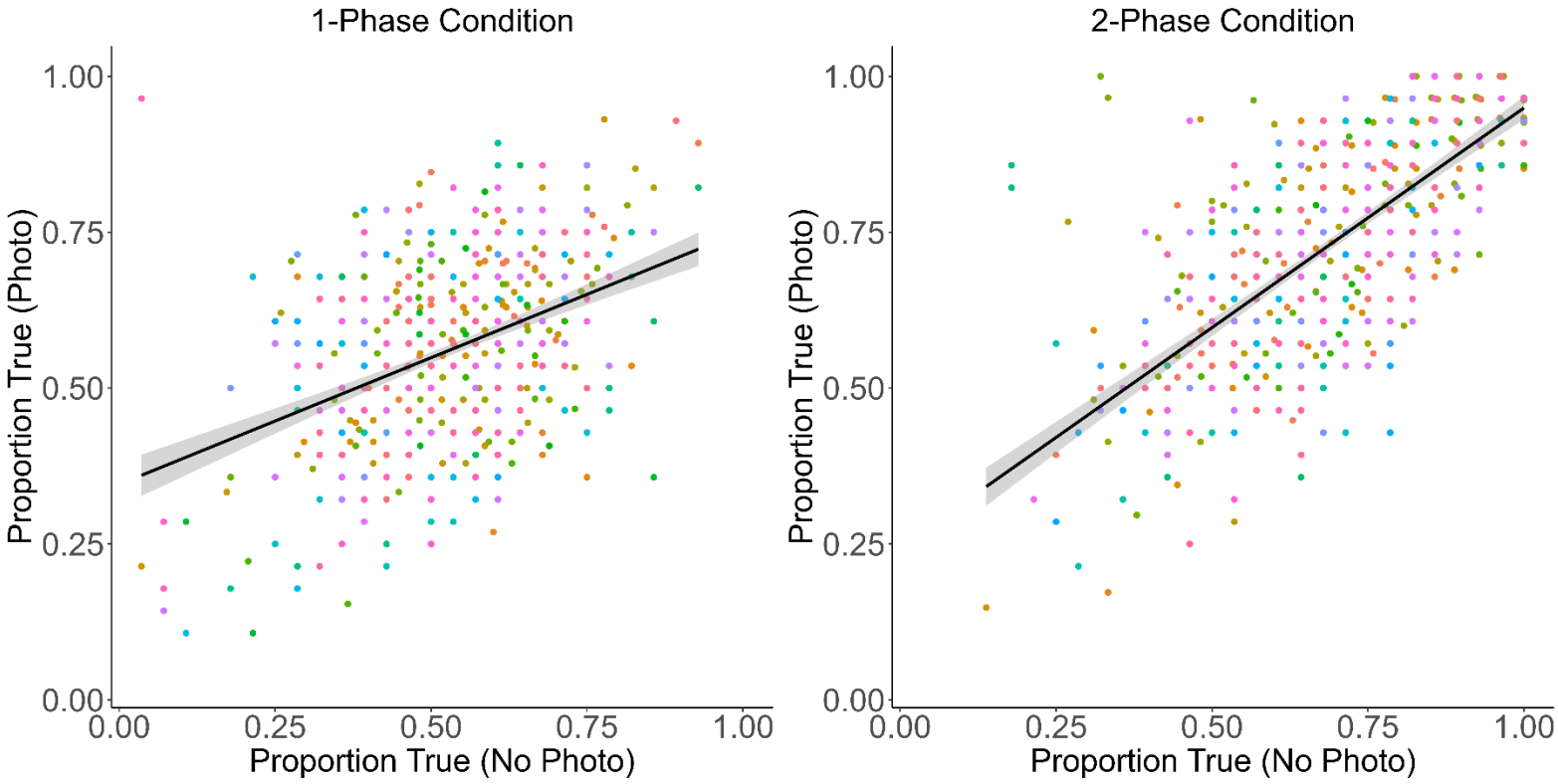
At the item level, the correlation between proportion judged as true for photo-present and photo-absent conditions were nearly identical across procedures (1-phase: r = .91, 95% CI [.85, .95]; 2-phase: r = .90, 95% CI [.83, .94]). This suggests that the perceived truth of individual items was highly stable across the 1-phase and 2-phase procedures. However, as shown in Figure 21, the 1-phase procedure exhibited a much wider range of values.

Figure 21. Correlations of Items Between Photo-Present and Photo-Absent on Proportion "True"



At the participant level, the 2-phase procedure produced a stronger correlation (r = .75, 95% CI [.71, .78]) between truth judgments for items presented with versus without a photo, compared to the 1-phase procedure (r = .39, 95% CI [.33, .45]); see Figure 22. This difference in correlation may largely reflect restricted range in the 2-phase condition, where participants showed generally higher rates of 'true' responses. Consistent with this, the regression lines in both conditions appear comparably elevated above the diagonal, suggesting similar truthiness effects across procedures.

Figure 22. Participant-Level Correlations Between Truth Judgments for Photo-Present and Photo-Absent Conditions



One possibility is that the greater variability observed in the 1-phase condition reflects a stronger or more consistent influence of photos on participants' truth judgements. That is, photos created stronger truthiness *and* falseness effects, suggesting not *just* that people are less consistent across photo-statement pairs in judging truth in the 1-phase, but rather that their degree of truth judgements is more dependent on the photo.

To identify whether there were stronger truthiness *and* falseness effects in the 1-phase than the 2-phase, item-level truthiness effects were faceted by phase (see Figure 20). In the 2-phase condition, the photos may influence judgements less, as photo and no photo are much more highly correlated. In the 1-phase condition, the immediate presence of the photo might amplify or dampen participants' perceptions in ways that vary more widely across different items. For

example, for some items, the photo might strongly reinforce a belief, while for others, it might create doubt. Figure 20 shows this to be marginally true, where the 1-phase condition appears to have slightly larger positive *and* negative truthiness effects, but these are small. The 1-phase condition had 12 items that had any reversed truthiness, whereas the 2-phase condition had 5 items with reversed truthiness. The top five "falsiness" items were identified in the 1-phase condition (there were almost no strong reversals in the 2-phase procedure - but the items that produced 'falsiness' were consistent across phases) to closely examine the associated statements and pictures. This allowed reflection on these specific items and consideration of the potential factors contributing to their behavior (see Figure 23).

Figure 23. The Top Five Items with the Highest Truthiness Reversals (Truthiness Scores in Parentheses)

Alberto Fujimori is a former president of Peru (-.141)

It is possible that individuals may not initially associate Asian heritage with Peru, and the photograph of Alberto Fujimori may provide visual evidence that reinforces this belief, beyond the implications of his name alone.

The mouth of a sea urchin is on its top (-.130)

For the sea urchin, the photo might present information that contradicts the claim. Specifically, the absence of a visible mouth on the sea urchin in the image, particularly on the top side (which offers the clearest view), could lead to doubt about the accuracy of the statement.

In fox hunting the hunter usually wears a red shirt (-.113)

In the case of the fox, the image might raise suspicion due to the seeming convenience of the hunter also wearing red, which could appear overly coincidental or unlikely, thus undermining belief in the claim.

Beet leaves contain toxins (-.097)

For beet leaves, visual familiarity may come into play. Upon seeing the image, individuals may think, "I've eaten those before," leading to a potential shift in their truth judgments based on personal experience.

Dough is boiled in the process of making croissants (-.050)

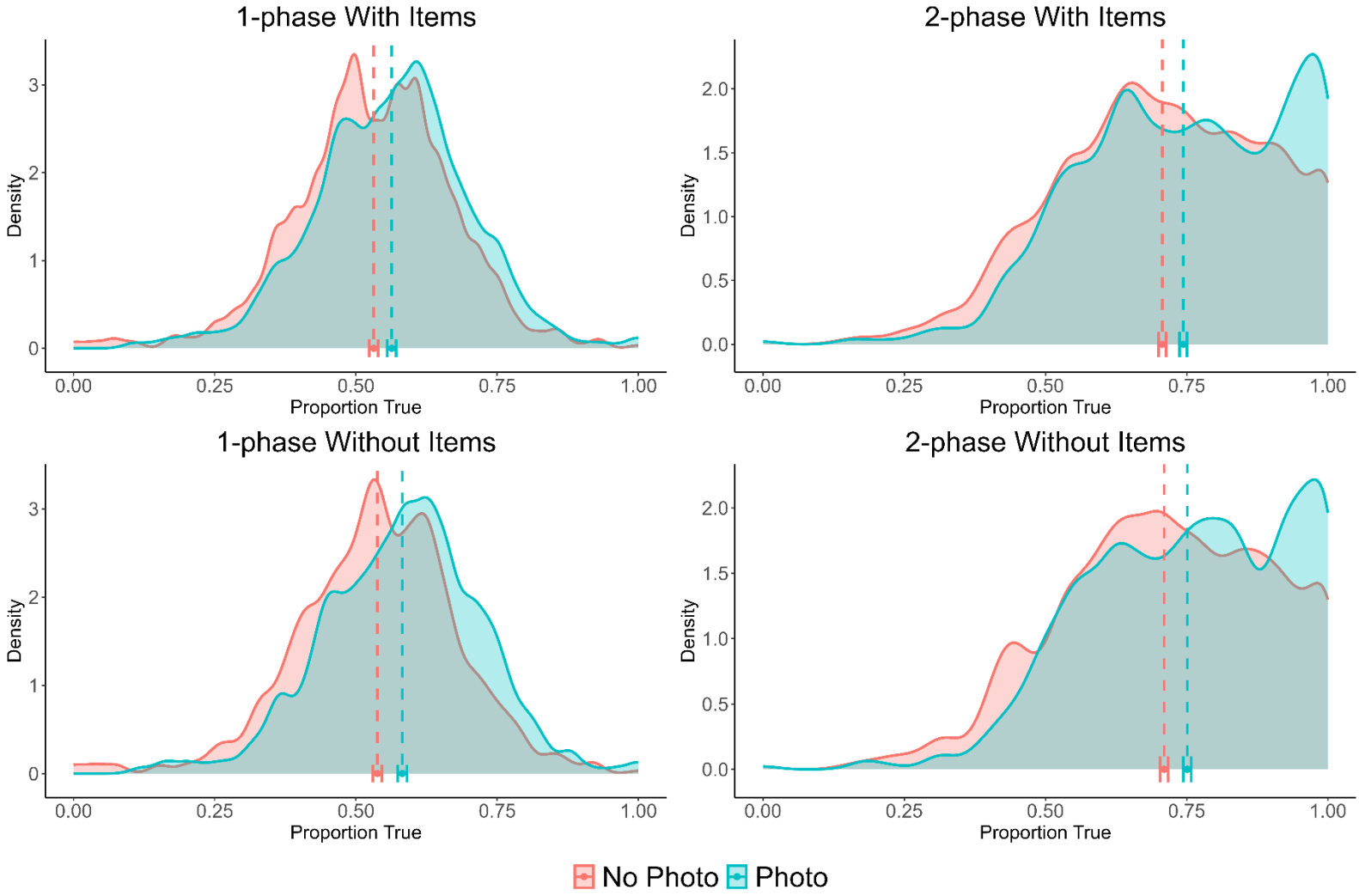
Seeing dough on the table might evoke memories of cooking videos and prompt skepticism, such as, "I've never seen this type of dough boiled." This could contribute to disbelief in the claim.

Given the greater number and magnitude of item-level falsiness effects, along with the increased variability in subject-level correlations between photo-present and photo-absent trials

in the 1-phase condition, it was hypothesized that removing the five items contributing most to falsiness would lead to the convergence of truthiness effect sizes between phases. A mini meta-analysis of Experiments 1- 4, and 6 revealed a Cohen's *d* of 0.21 (95% CI [0.13, 0.28]) for the 1-phase condition, whereas the 2-phase condition yielded a Cohen's *d* of 0.29 (95% CI [0.21, 0.36]). After excluding the five items with the strongest falsiness effects, the 1-phase condition showed an increased Cohen's *d* of 0.28, 95% CI [0.21, 0.35], and the 2-phase condition produced a slightly increased Cohen's *d* of 0.31, 95% CI [0.23, 0.38]. This suggested that the 1-phase procedure's effect size was more strongly influenced by the "falsiness" items than was the 2-phase condition (see Figure 24).

When all items were retained, there was a non-significant difference suggestive of a larger truthiness effect in the 2-phase condition. However, after removing the five items with the strongest reversed truthiness effects (averaged across experiments and phases), the difference between the 1-phase and 2-phase conditions was eliminated. This suggests that the effect size in the 1-phase procedure was attenuated by these reversed items, as suggested from Figure 20. It is plausible that the larger effect size in the 2-phase procedure is driven primarily by the relative scarcity and smaller magnitude of falsiness effects, rather than by greater truthiness effects. In other words, the larger effect size in the 2-phase procedure may not reflect a stronger truthiness effect but rather the absence of notable falsiness effects, which contribute more strongly to the effect size in the 1-phase procedure. Interestingly, the correlations between photo-present and photo-absent remained similar between the datasets with and without the items (*r*'s stayed within .02 across the datasets).

Figure 24. Kernel Density Estimate Plots of Proportion True in Experiments 1-4 & 6 when Picture Present/Absent, With and Without the Five Largest 'Falsiness' Items



Baseline Truth Judgments and the Magnitude of the Truthiness Effect

To examine whether baseline truth judgments (i.e., truth ratings in the no-photo condition) predict the magnitude of the truthiness effect, the correlation between baseline truth judgments and the truthiness effect (photo-present - photo-absent) was calculated at both the participant (Figure 25) and item (Figure 26) levels, collapsed across the 1- and 2-phase conditions. At the participant level, a significant negative correlation (r = -.43, 95% CI [-.46, -.39]) indicated that

participants who generally judged more no-photo items as true tended to exhibit smaller truthiness effects overall. This aligns with the intuition that participants who already perceive statements as highly true have limited room for further increases, whereas those who are more skeptical have greater capacity for photos to shift their judgments. In contrast, at the item level, the correlation was positive but weak and non-significant (r = 0.15, 95% CI [-.05, .35), suggesting that items generally rated as true did not exhibit truthiness effects. This non-significant correlation contrasts with the strong negative effect observed at the participant level, suggesting that while participants who generally rate items as true show reduced truthiness effects, this pattern does not hold for items.

As shown in Figure 25, subjects were strongly biased toward judging items as true, consistent with previous findings. This suggests an overall bias toward truth in the baseline condition, consistent with previous findings on truth perception biases. These findings reinforce the idea that the truthiness effect operates more strongly for participants that perceive trivia claims as implausible or ambiguous, with limited additional influence on statements that are already widely accepted as true. Figures 25 and 26 illustrate the correlation between baseline truth judgments and truthiness effects at the participant and item levels, respectively.

Figure 25. Correlation Between Baseline Truth and Truthiness Effect at the Participant Level Collapsed Across 1- and 2-Phase Conditions

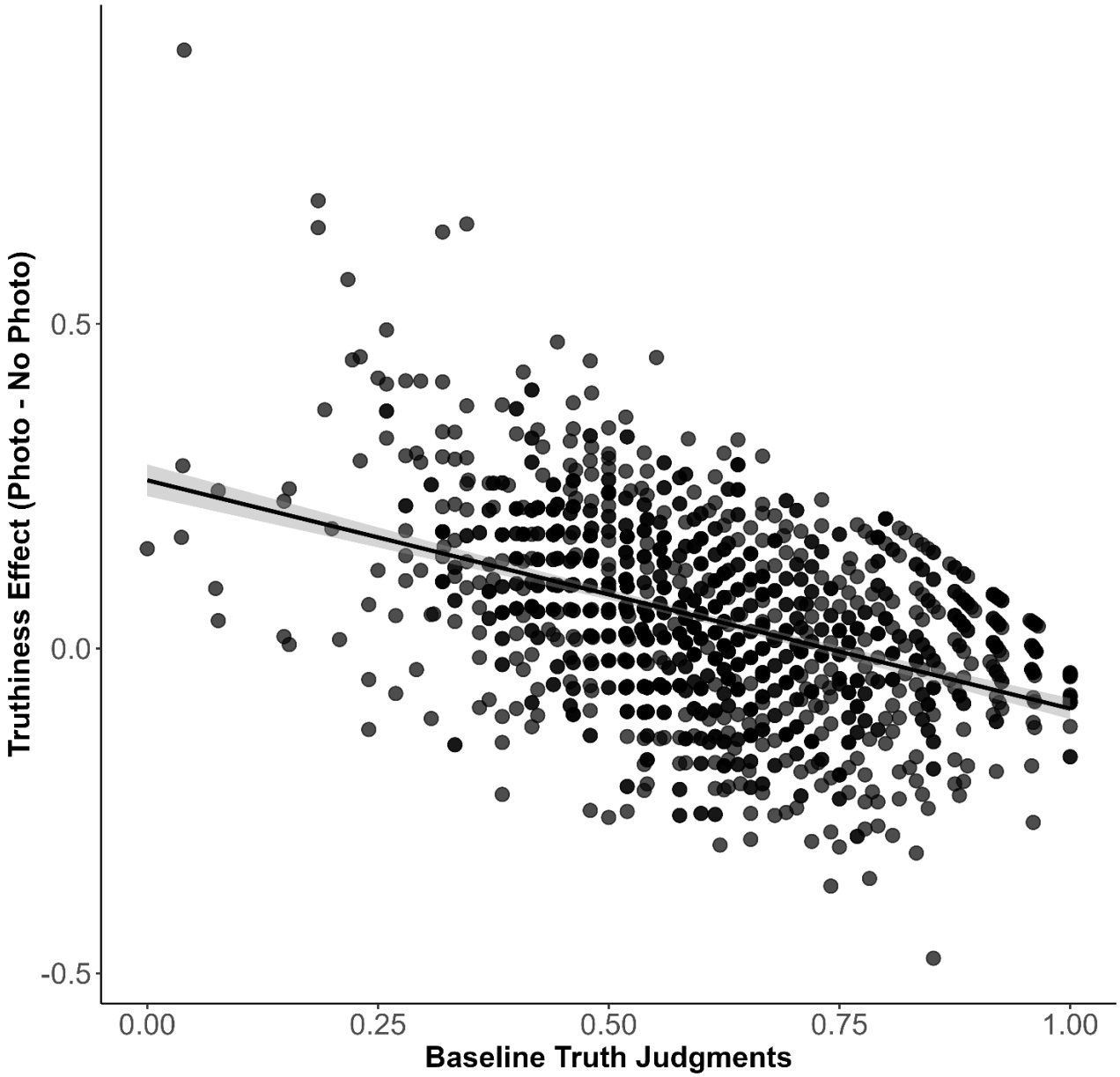
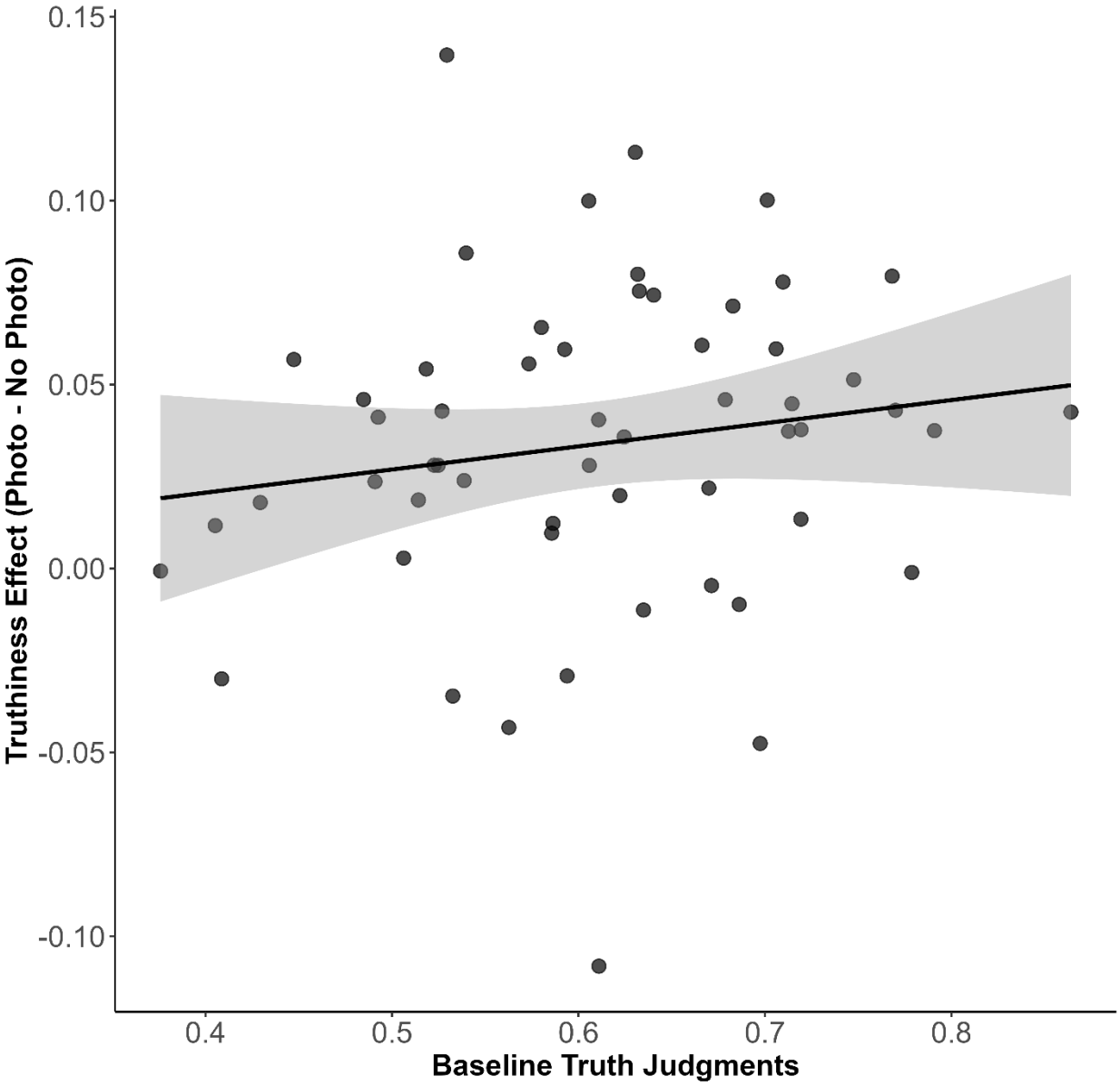


Figure 26. Correlation Between Baseline Truth and Truthiness Effect at the Item Level Collapsed Across 1- and 2-Phase Conditions



In sum, the item effects indicate that some items are inherently more believable than others (eliciting higher truth judgments), some items exhibit stronger truthiness effects than others, and the magnitude and direction of these effects vary by phase. Still, there were many more items for which "True" ratings were directionally greater when the item was presented with

a picture, consistent with the truthiness effect. Despite the null effect in Experiment 5 and the reversed effect in Experiment 3, a mini-meta-analysis across the experiments provides strong evidence for the existence of a truthiness effect in both the 1- and 2-phase conditions.

Response Time

Reversed truthiness effects may arise when subjects perceive an image as discrepant with the accompanying claim (see Figure 23). Noting an inconsistency might prompt a participant to pause and scrutinize the photo more carefully. In Kahneman's (2011) terms, subjects may shift from System 1 to System 2 processing. As a result, the usual fluency-based mechanisms that drive truthiness effects may be disrupted. This disruption may even drive fluency below the baseline level observed in the no-photo condition, signaling falsity. Alternatively, this increased scrutiny may encourage participants to critically evaluate the claim and the photo together, activating thoughts like those hypothesized in Figure 23. If truthiness effects rely on processing fluency, then items that elicit stronger truthiness effects should be associated with faster response times, whereas items that produce weaker or reversed effects should correspond with longer response times. Furthermore, participants with larger average truthiness effects should also exhibit faster average response times.

A series of analyses were conducted to examine the relationship between response time and truthiness effects. Data from Experiments 1, 2, 3, and 6 were included. Experiment 5 was excluded due to null results, and Experiment 4 lacked response time data. Response time data was log-transformed and standardized (RT_{LS}) to address strong skew and aid in model convergence.

To examine whether response time and picture presence predict the probability of an item being judged as true, a linear regression was conducted with proportion of "true" responses as the dependent variable and RT_{LS}, picture presence (photo vs. no-photo), and their interaction as predictors. The overall model was not significant, $F(3,108) = 2.05$, $p = .111$, accounting for only 5.4% of the variance in truth judgments, $R^2 = .054$. Neither RT_{LS}, $b = -0.199$, $t(108) = -1.54$, $p = .125$, nor picture presence, $b = -0.043$, $t(108) = -0.24$, $p = .811$, were significant predictors of proportion true. Additionally, the interaction between RT_{LS} and picture presence was not significant, $b = 0.086$, $t(108) = 0.50$, $p = .619$, indicating that the relationship between response time and truth judgments did not vary between the photo-present and photo-absent conditions.

To assess whether response time differences predict item-level truthiness effects, a linear regression was conducted with the truthiness effect (proportion true in the photo-present condition minus proportion true in the photo-absent condition) as the dependent variable and RT_{LS} difference between the two conditions as the predictor. The model was not significant, $F(1,54) = 0.017$, $p = .896$, $R^2 = .0003$, indicating that RT_{LS} differences were not associated with truthiness effects at the item level. The regression coefficient was not significant, $b = -0.010$, $t(54) = -0.13$, $p = .896$; items with larger response time differences did not show stronger or weaker truthiness effects. See Figure 27 for details.

A mixed-effects logistic regression was conducted to assess whether trial-level response times predict truth judgments, while accounting for random variability across participants and items. The model included RT_{LS}, picture presence (photo-present vs. photo-absent), and their interaction as fixed effects, with random intercepts and slopes for participants and random intercepts for items. The main effect of RT_{LS} was significant, $b = -0.290$, $z = -14.50$, $p < .001$, indicating that faster responses were associated with a greater likelihood of endorsing a

statement as true. The OR was 0.75, suggesting that for every 1SD increase in RT_{LS}, the odds of judging a statement as true decreased by 25%. This supports the idea that longer deliberation reduces the likelihood of endorsing a statement as true. The main effect of picture presence was also significant, $b = 0.232$, $z = 10.76$, $p < .001$, OR = 1.26, consistent with the truthiness effect. Importantly, the interaction between RT_{LS} and picture presence was also significant, $b = -0.103$, $z = -4.49$, $p < .001$ suggesting that the association between response time and truth judgments was moderated by picture presence. The OR for the interaction was 0.90, suggesting that the longer participants wait to respond, the less impactful the photo became in increasing truth judgements; for each 1-SD increase in RT_{LS}, the odds of judging an item as true were 10% lower in the photo condition compared to the no-photo condition.

To illustrate the relationship between response time and truth judgments on its original scale, predicted probabilities were computed at meaningful time intervals, separately for the photo-present and photo-absent conditions. At a response time of 2 seconds, the probability of endorsing a statement as true was approximately .73 in the photo-present condition and .67 in the photo-absent condition, reflecting the observed truthiness effect. However, as response time increased, the probability of judging a statement as true decreased in both conditions. At a response time of 5 seconds, the probability of endorsement dropped to .63 for the photo-present condition and .59 for the photo-absent condition. At 10 seconds, the probabilities further declined to .56 and .54, respectively. Figure 29 displays this relationship.

Random effects suggested substantial variability across subjects and items. For subjects, there was variance in baseline truth responses (SD = 0.71) and response time effects (SD = 0.14). There was also variance for items in baseline truth responses (SD = 0.30). Figure 28 illustrates the predicted probability of responding "true" as a function of RT_{LS}, separately for the photo-

present and photo-absent conditions. It visualizes the finding that, as response times increased, the probability of endorsing statements as true decreased, consistent with the expectation that longer deliberation reduces the truthiness effect. The photo-present condition exhibited slightly higher truth judgments on average, but this effect disappeared at longer response times.

Finally, to examine whether participants who exhibited larger response time differences between conditions also showed stronger truthiness effects, a linear regression was conducted with truthiness effect (proportion true in photo-present condition minus proportion true in photo-absent condition) as the dependent variable and RT_{LS} difference as the predictor. The model was significant, $F(1,1273) = 4.62$, $p = .032$, $R^2 = .0036$ indicating a miniscule but significant relationship between RT_{LS} differences and truthiness effects. The regression coefficient was negative, $b = -0.032$, $t(1273) = -2.15$, $p = .032$, suggesting that participants who paused for longer when viewing a photo tended to show weaker truthiness effects. However, these effects were miniscule.

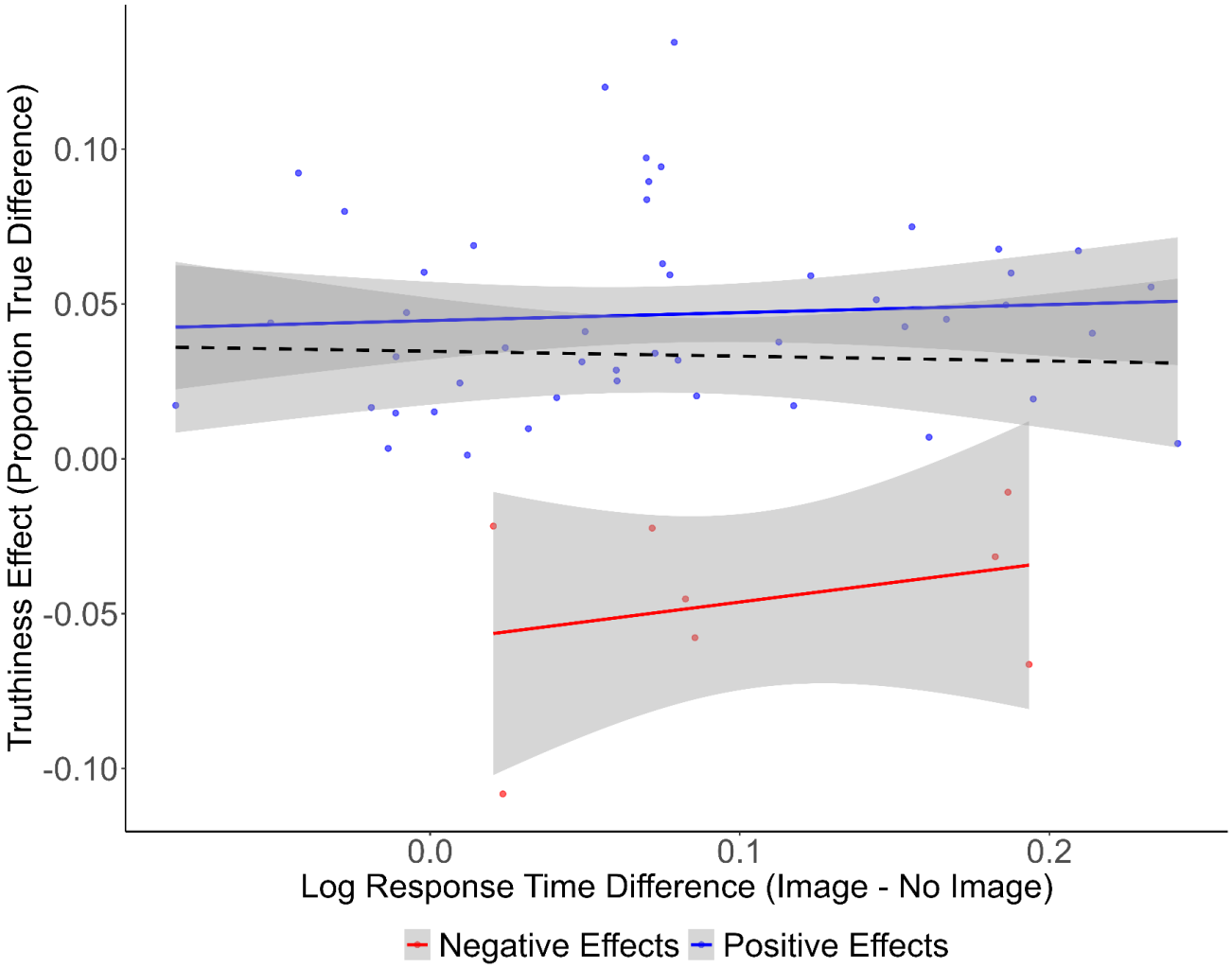
The discrepancy between the non-significant results from item-level models and the significant findings from the mixed-effects model likely arises from differences in the granularity of analysis. At the item level, aggregating across participants introduces variability that can obscure systematic relationships between response time and truth judgments, particularly if individual differences in response strategies exist. In contrast, trial-level analyses, which account for within-subject variability and allow response time effects to be estimated more precisely, revealed a significant relationship between response time and truthiness. This distinction is evident in Figure 27, which shows no clear correlation between item-level response times and truthiness effects, whereas Figures 28-29 illustrate that at the trial level, faster responses are

associated with greater truthiness effects, and slower responses reduce the likelihood of judging a statement as true.

Taken together, these results indicate that response time was related to truth judgments, though its relationship with the truthiness effect varies across levels of analysis. At the item level, response time differences between photo-present and photo-absent conditions did not predict the magnitude of the truthiness effect, suggesting that item-level response latencies do not systematically influence whether an image increases or decreases truth judgments. At the trial level, response time emerged as a significant predictor of truth judgments, with faster responses associated with an increased likelihood of endorsing statements as true. This effect was moderated by picture presence, with the truthiness effect diminishing at longer response times, consistent with the interpretation that increased deliberation disrupts fluency-based judgments.

These findings highlight the importance of considering response time as an index of cognitive processing in truthiness effects. While rapid responses are associated with higher endorsement rates, longer response times - particularly in the photo condition - appear to attenuate the truthiness effect, potentially reflecting increased scrutiny or deliberative reasoning. It is also possible that specific photos do not provide quasi-evidence of falseness but instead simply reduce the perceptual fluency of the photo-claim pairs below others, and it is this comparative context that drives the falsiness effects. The pattern of results aligns with dual-process theories of judgment (Kahneman, 2011), wherein fluency-based truth judgments are more likely to occur under fast, intuitive processing (System 1), whereas slower, more effortful processing (System 2) may reduce or even reverse these effects. However, the small effect sizes observed suggest that response time alone is not a primary driver of truthiness effects, but rather one of several factors influencing truth judgments.

Figure 27. Scatterplot of Response Time and Truthiness Effect by Item (Positive vs. Negative Effects)



Note: The dashed black line represents the overall regression line, capturing the relationship between log response time differences (image – no image) and the truthiness effect across all items. Each point corresponds to a single item. Items categorized as "Negative Effects" (red) exhibited falsiness effects, while items categorized as "Positive Effects" (blue) exhibited truthiness effects. The solid red and blue lines indicate separate regression trends for these two categories, with shaded regions representing 95% confidence intervals.

Figure 28. Predicted Probability of Truth Judgments by Log-Standardized Response Time and Picture Presence

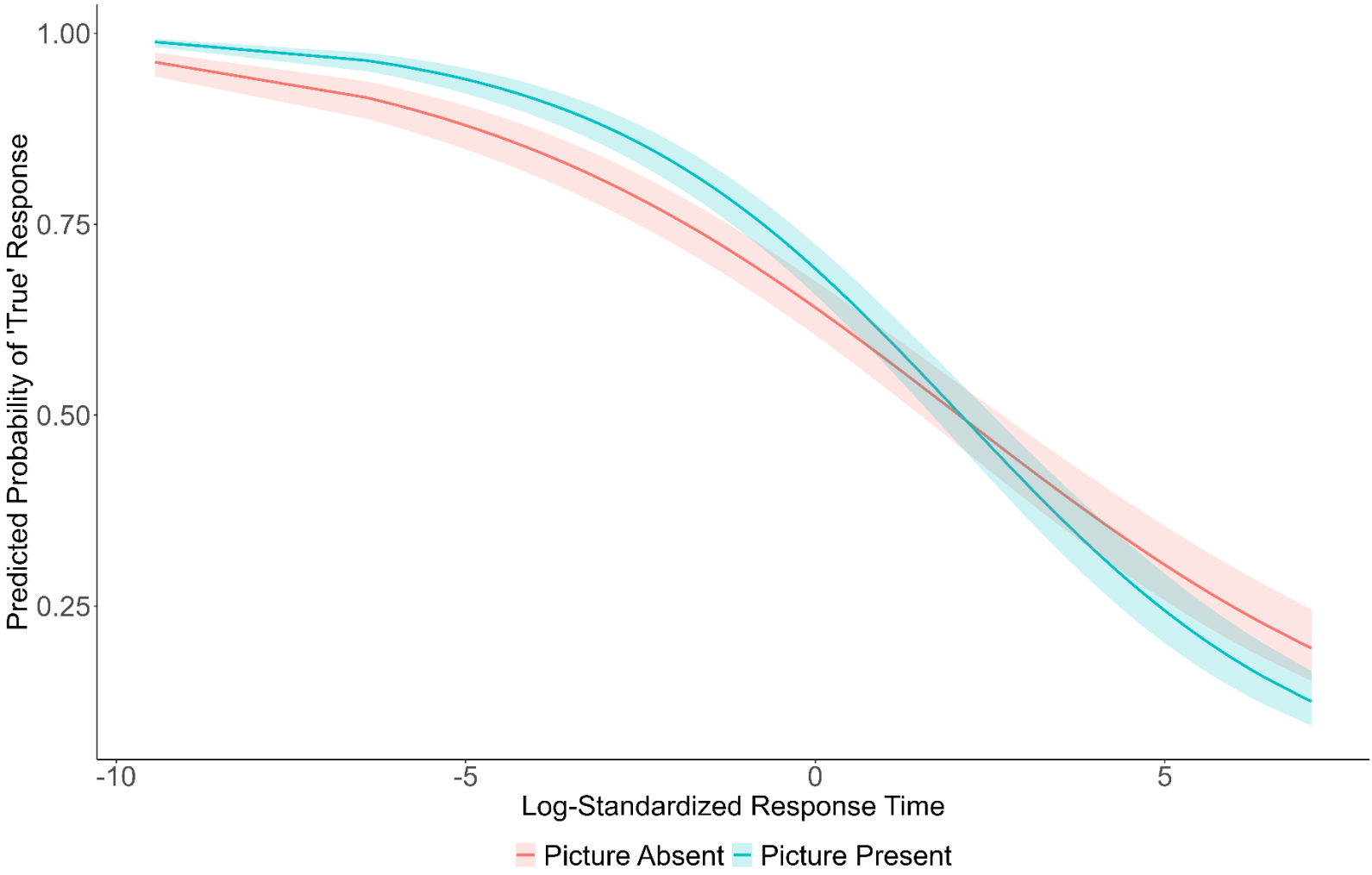
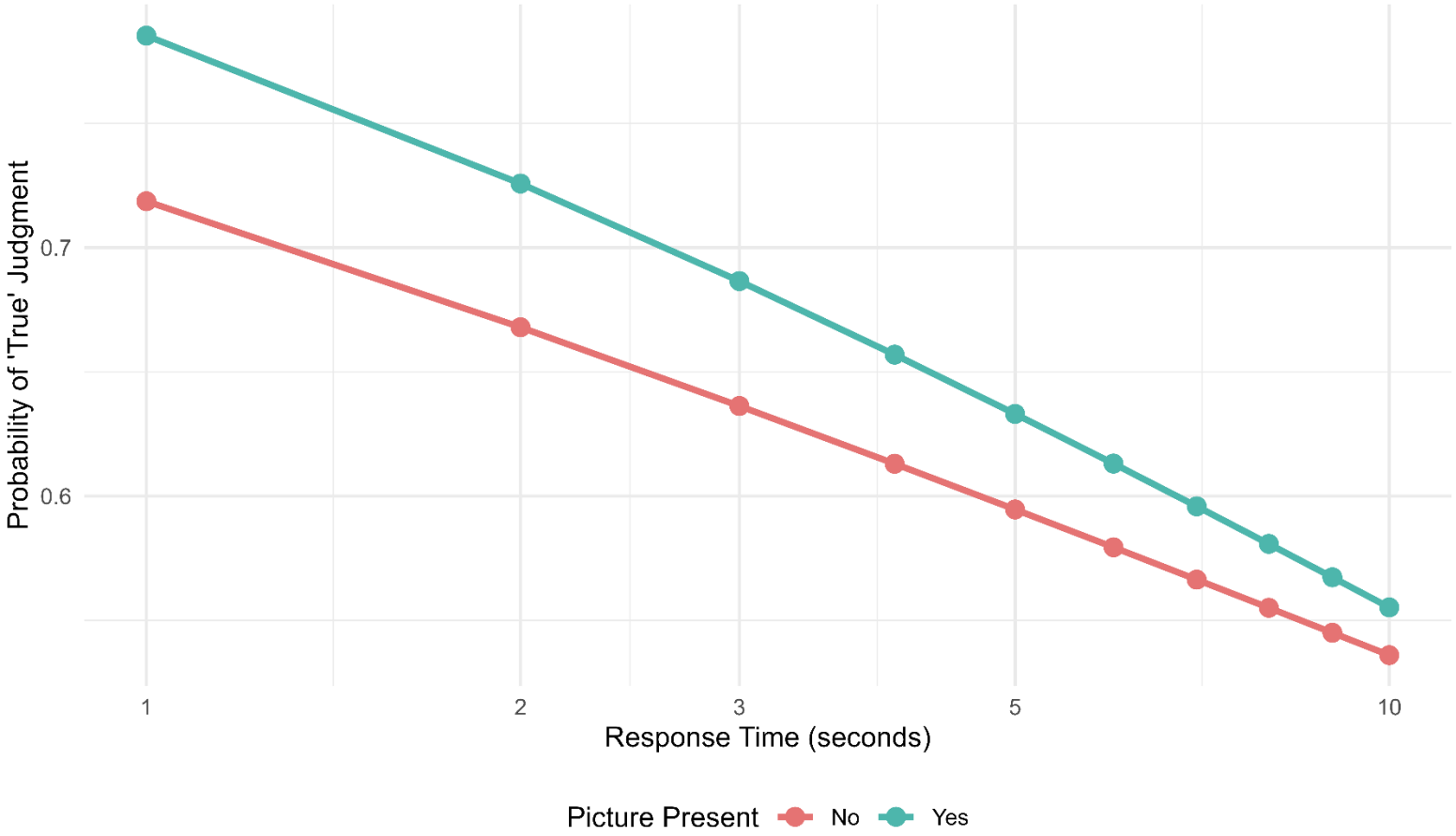


Figure 29. Predicted Probability of Truth Judgements by Response Time in Seconds and Picture Presence



Note: The model used log-transformed response times as a predictor, but values have been back-transformed to the original time scale for easier interpretation.

An important limitation of the RT analyses is that the photo-present and photo-absent conditions differed not only in their potential influence on fluency but also in perceptual load. In photo-present trials, participants had to process the photo alongside the claim, introducing extra cognitive demands. As a result, even if the photo increased subjective fluency, response times may have been mechanically longer due to the added processing steps. This confound complicates interpretation of RT differences across conditions. Additionally, in the 1-phase procedure, RTs reflect the joint processing of the claim and, when present, the photo, whereas in

the 2-phase procedure, response times capture claim evaluation alone. Although the 2-phase design more cleanly isolates the intended fluency-based judgment process, these structural differences complicate direct comparisons of response times across procedures. Also, subjects performed the experiment unsupervised in settings and at times of their choosing and using their own computers. And the instructions did not encourage speedy responses. All of those aspects of our procedure likely added noise to the RTs as a measure of processing time.

Changing the Exclusion Criteria

Some items exhibited a very high proportion of true responses across experiments. To mitigate the ceiling effects and better observe the truthiness effect, the top ten highest-scoring items and participants were removed, and the data collapsed across experiments. Given the correlations between experiments on the proportion judged “True” (Figure 9), this approach should increase statistical power to detect the predicted increase in the truthiness effect in the 2-phase procedure when combining data from all experiments (except for Experiment 5). Although plots are not shown here, a key takeaway was that the overall pattern of results remained consistent, even when various subsets of data were removed (e.g., items with the highest truthiness scores, items with the highest proportion of true responses, or participants who judged every item as true). Various combinations of removing subjects and items with high proportion true values across different conditions were applied. In none of these cases was the truthiness effect significantly larger or directionally reversed in the 2-phase condition compared to the 1-phase condition, nor did the overall increase in proportion true in the 2-phase condition disappear. The only exclusion that impacted the truthiness effect across phases was excluding the five items with the strongest falsiness effects. This exclusion led to an increase in the truthiness

effect size in the 1-phase condition, making it nearly identical to that of the 2-phase condition.

Revisiting the Interaction Between Phase Conditions

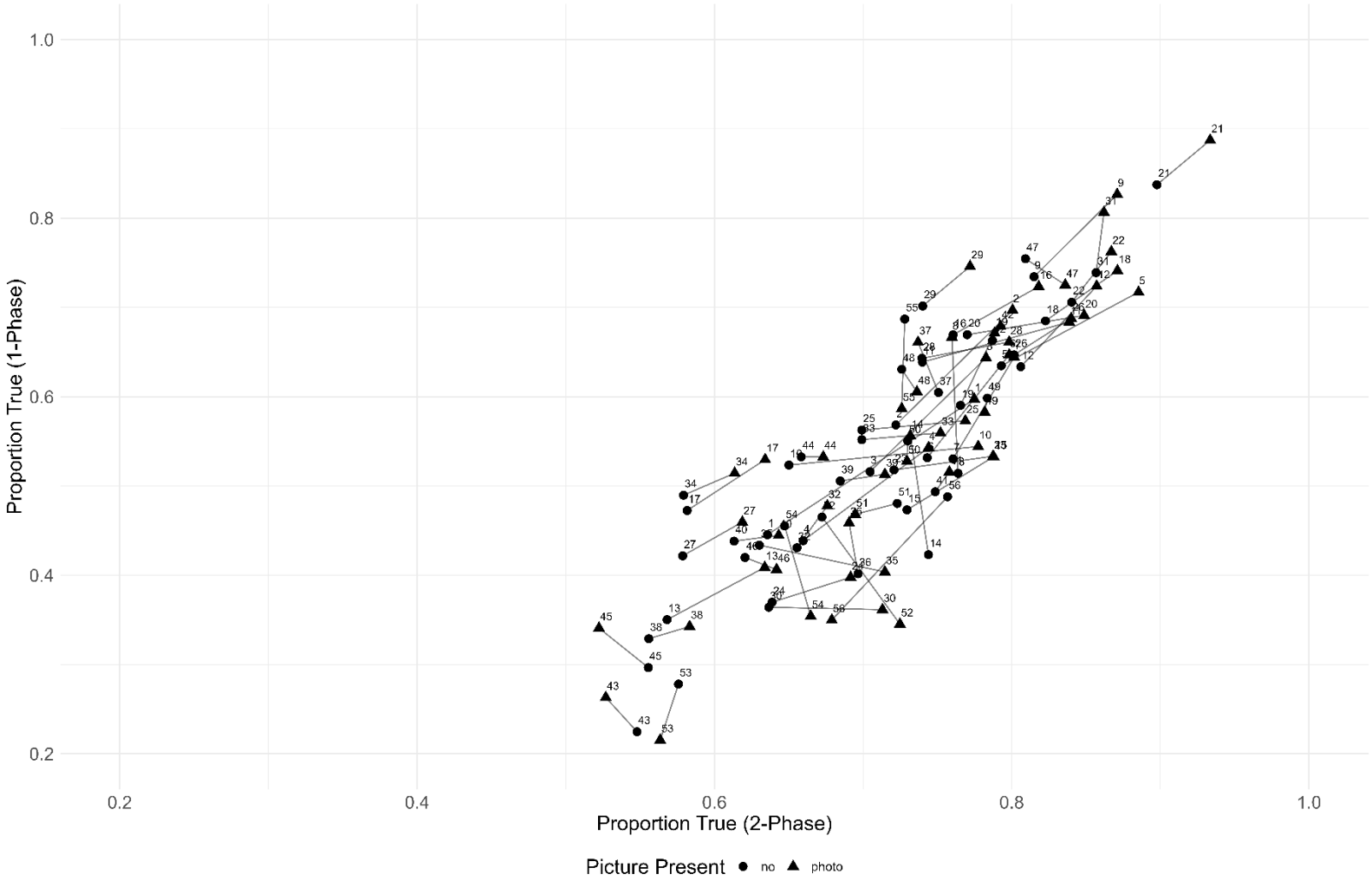
Given the consistent falsiness effects observed for certain items and the reduction of variability and item-level detail in previous analyses by collapsing data by subject, the interaction between photo and phase was revisited. The following section presents two plots visualizing this interaction, followed by two models analyzing the combined dataset with explicit modeling of items.

Figure 30 illustrates the relationship between the proportion of "True" judgments in 1-phase and 2-phase conditions for each item, with each item represented by a pair of points connected by a line. Circles denote judgments made without a photo, while triangles indicate judgments with a photo. The distance between each pair of points reflects the impact of photo presence on truth judgments between the two phases. For example, item 44 (Canada is the second largest country in the world by area) was judged true at nearly the same rate when it was presented with and without a photo in both the 1- and 2-phase conditions. Item 55 (Alberto Fujimori was the president of Peru) was much less often judged as true when presented with than without a photo in 1-phase condition (falsiness), but not in the 2-phase condition. Item 56 (The mouth of a sea urchin is on its top) was much more often judged true when presented without a photo than with a photo in both the 1-phase and 2-phase conditions.

Some items align closely to a 45° angle upward and rightward, indicating similar proportions of "true" judgment increases between the 1-phase and 2-phase conditions. When both the "photo" and "no photo" conditions for an item align along this angle, it suggests that the influence of a photo on truth judgments does not vary between phases for that item. In contrast, items with points that diverge from this angle indicate that photo presence affects truth

judgments differently between the phases. The greater the separation between the points and their deviation from the angle, the stronger the indication of an interaction between phase and photo presence.

Figure 30. Scatterplot of Proportion True Between 1- and 2-Phase Conditions by Item and Picture Presence

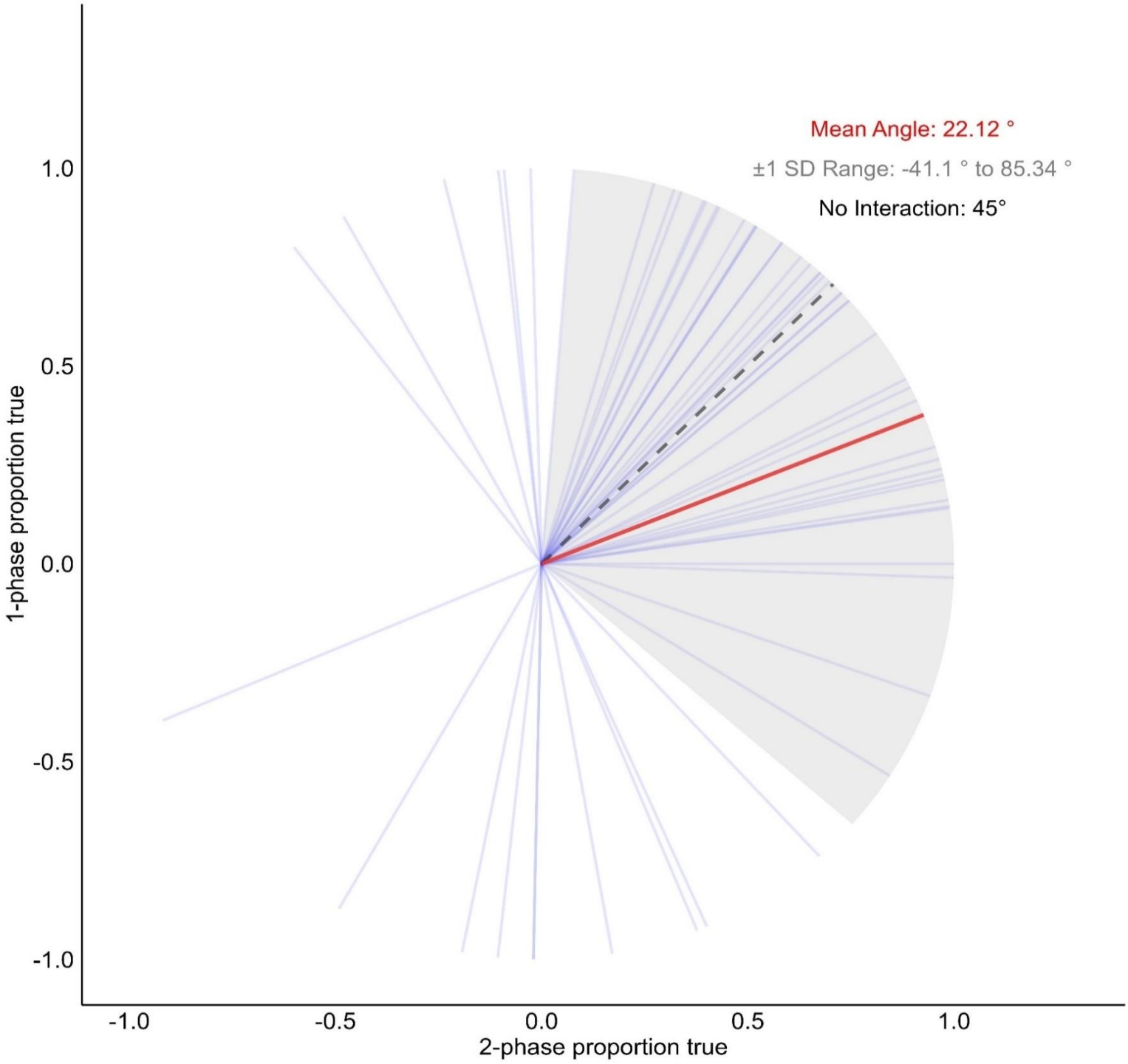


Item Number	Item Name	Item Number	Item Name	Item Number	Item Name	Item Number	Item Name
1	domesticated goats	15	cacti can	29	the cocos	43	a group
2	dart boards	16	the hummingbird	30	sticky toffee	44	canada is
3	the stationary	17	giraffes are	31	pluto is	45	none of
4	a wobbler	18	the cat	32	competitive badminton	46	a pandas
5	seine nets	19	the flamingos	33	the manta	47	cabbages are
6	the statuette	20	the plastic	34	the name	48	a full
7	the invention	21	dogs have	35	the electric	49	women dream
8	kvass is	22	months that	36	both sexes	50	corn was
9	the carpathian	23	the liquid	37	the sun	51	dough is
10	taboga island	24	flyfishing is	38	normal colour	52	in fox
11	lake baikal	25	the navy	39	the largest	53	the electron
12	the colour	26	the first	40	the stones	54	beet leaves
13	vesuvius is	27	the yonghe	41	starfish dont	55	alberto fujimori
14	female turkeys	28	in almost	42	the nile	56	the mouth

To evaluate the potential interaction between 1- versus 2-phase condition and photo presence, the angles between points representing each item in the 1-phase and 2-phase conditions were calculated, as shown in Figure 31. Using the *atan2* function, angles based on the horizontal (x-axis) and vertical (y-axis) differences were derived, producing values in a -180° to 180° range. An angle of +45° (rightward and upward) suggests both phases contribute similarly to truth judgments, indicating no interaction effect. A -45° (rightward and downward) angle, however, reflects opposing effects, with one phase increasing truth judgments and the other decreasing them. The -180° to 180° range offers advantages over 0° to 360° by preserving the continuity of directional trends, such as treating -1° and 1° as close neighbors, which helps avoid misleading averages near the boundary. This convention also minimizes distortions in standard deviation calculations and aligns more intuitively with left/right or up/down data orientations, reducing the risk of interpreting boundary-crossing data as overly dispersed.

A mean angle of 22.12° was found, indicating a slight upward and rightward trend. This suggests that, on average, both phases influence truth judgments in a generally consistent direction, though not perfectly aligned (as would be indicated by 45°). The standard deviation of 44.24° shows substantial variability, implying that the effect of the phases on truth judgments differs widely across items. While some items approached the ideal 45° (consistent influence of both phases), others diverged significantly, suggesting an interaction in which photos impacted truth judgments differently in the 1- versus 2-phase condition (see Figure 31).

Figure 31. Mean, ±1 SD, and Individual Item Angles Between 1- and 2-Phase Conditions



Note: The red line represents the mean angle of all items, while the grey area indicates one standard deviation around this mean. The black dashed line marks the 45-degree reference angle, and the blue lines show the angles of individual items.

Modelling Item Variability with a Mixed-Effects Logistic Regression

Given the influence of specific items on the truthiness effect in the 1-phase procedure, and the underpowered nature of most studies to detect the interaction, data from experiments 1-4 and 6 were merged. A multilevel logistic regression was conducted instead of creating a "proportion true" variable that reduces variability by collapsing data by subject. The likelihood of a statement being judged as true was predicted based on phase and picture presence, incorporating random intercepts and slopes for both subjects and items. This approach allowed assessment of how the impact of picture presence might vary among different subjects and items, recognizing that the influence of a photo on perceived truthfulness could differ significantly across items.

A Type III Wald chi-square test was conducted to evaluate the influences of phase, picture presence, and their interaction on the probability of a statement being judged as true. The results indicated significant main effects of phase, $\chi^2(1) = 267.09$, $p < .001$, and picture presence, $\chi^2(1) = 14.32$, $p < .001$, replicating prior ANOVA results. Additionally, there was a significant phase × photo interaction, $\chi^2(1) = 5.72$, $p = .017$, suggesting that the effect of photos on truth judgments differed across phase conditions.

Participants in the 2-phase condition were significantly more likely to judge statements as true than those in the 1-phase condition, OR = 2.58, 95% CI [2.30, 2.89], $z = 16.34$, $p < .001$. Statements presented with a photo were more likely to be judged as true than those without a photo, OR = 1.17, 95% CI [1.08, 1.27], $z = 3.78$, $p < .001$. The phase × picture presence interaction was also significant, OR = 1.11, 95% CI [1.02, 1.21], $z = 2.39$, $p = .017$, indicating

that the photo-truthiness effect was stronger in the 2-phase condition than in the 1-phase condition.

Pairwise comparisons were conducted to examine the effect of picture presence within each phase. In the 1-phase condition, the presence of a photo significantly increased the odds of a statement being judged as true by 17%, OR = 1.17, 95% CI [1.08, 1.27], $z = 3.78$, $p < .001$. In the 2-phase condition, this effect was larger, increasing the odds by 30%, OR = 1.30, 95% CI [1.19, 1.43], $z = 7.00$, $p < .001$. The effect of a photo on truth judgments is 11.27% stronger in the 2-phase condition compared to the 1-phase condition, as indicated by the significant phase × picture presence interaction. This translated into an 18% greater probability increase in truth judgments. This suggests that temporally separating photo exposure from truth judgments amplifies the photo-truthiness effect.

Estimated marginal means indicated that in the 1-phase condition, the probability of judging a statement as true was .54 (95% CI [.50, .58]) when no photo was present, increasing to .58 (95% CI [.53, .62]) when a photo was present ($M_D = .039$). In the 2-phase condition, the probability of a "true" judgment was .75 (95% CI [.72, .77]) with no photo, rising to .80 (95% CI [.77, .82]) with a photo ($M_D = .046$).

Modelling Item Variability with a Bayesian Mixed-Effects Model

To confirm the findings, a Bayesian analysis of the influence of phase, photo presence, and their interaction on truth judgments was conducted. A multi-level logistic regression model using a Bayesian framework was fit, with a binary outcome variable indicating whether a statement was judged as true or false. The model included fixed effects for phase, photo presence, and their interaction. For the random effects structure, the model included by-item

random intercepts and random slopes for phase, photo presence, and their interaction. This allowed each item to have its own baseline truth rating and to show unique sensitivity to the experimental manipulations. Additionally, the model included by-subject random intercepts and random slopes for photo presence, which accounted for individual differences in participants' overall tendency to judge statements as true and in their susceptibility to the influence of photographs.

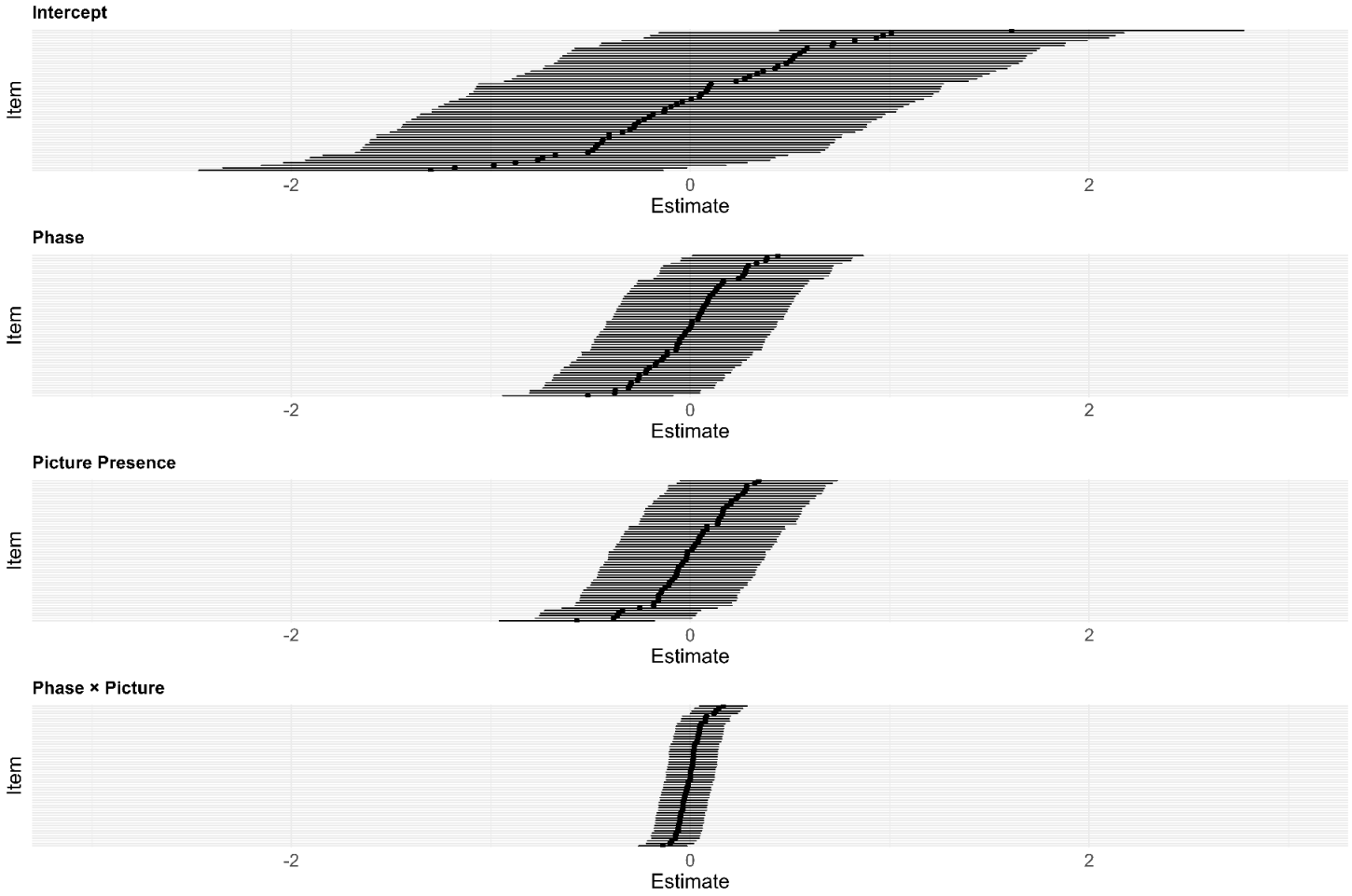
Model parameters were estimated using the No-U-Turn Sampler (NUTS), a form of Hamiltonian Monte Carlo (HMC) designed for efficient exploration of high-dimensional parameter spaces. The model was fit using two Markov chains with 1,000 iterations per chain, of which the first 500 were used for warm-up. This resulted in 1,000 post-warmup draws per parameter. To assess the reliability of the estimates, potential scale reduction factors (Rhat) and effective sample sizes (ESS) were examined. Rhat values were close to 1.00 for all parameters, indicating convergence across chains. BulkESS values confirmed adequate sampling efficiency in the central region of the posterior distribution, while TailESS values ensured stable estimation in the distribution’s tails. These diagnostics provided strong evidence of convergence and robust estimation.

The fixed effect estimates indicate that phase had a significant positive effect on truth response (β = 0.94, *SE* = 0.06, 95% CI [0.82, 1.07], suggesting that participants in the two-phase condition were more likely to judge items as true compared to those in the one-phase condition. The presence of a photo also had a small but significant positive effect (β = 0.16, *SE* = 0.04, 95% CI [0.08, 0.24], revealing the photo-truthiness effect. Additionally, a small interaction effect was found between phase and photo presence (β = 0.11, *SE* = 0.04, 95% CI [0.02, 0.20], suggesting that the photo-truthiness effect was slightly greater in the two-phase condition.

The random effects for items showed substantial variability in intercepts (*SD* = 0.60), as well as in the effects of phase (*SD* = 0.25) and photo presence (*SD* = 0.23). Figure 32 presents item-level random effects estimates for the model parameters. For subjects, the random intercept variance was substantial (*SD* = 0.79), while the variance in sensitivity to the photo effect was smaller (*SD* = 0.41). The correlation between the random intercept and the photo effect was near zero (*r* = -.10), suggesting minimal systematic individual differences in baseline truth judgment tendencies and sensitivity to the photo condition. See Table 1 and 2 for more details.

The findings from both the frequentist and Bayesian models suggest that both phase and the presence of a photo significantly influence truth judgments, where the truthiness effect was slightly greater in the 2-phase. They suggest that, when considering the variability of items and subjects in response to the presence of a photo, the 2-phase procedure enhances the likelihood of a statement being perceived as true by approximately 10% more than in the 1-phase. Notably, even with a model incorporating multiple random effects and a large dataset of 81,424 data points, the interaction effect remained small. For details on the Bayesian model and odds ratios, see Tables 1 and 2. These results suggest that, in its current forms, the 2-phase condition does not produce a *meaningful* increase in the truthiness effect.

Figure 32. Item-Level Random Effects Estimates for Intercept and Fixed Effects



Note: Each panel displays the distribution of item-specific estimates with uncertainty intervals. The random intercept represents baseline differences in item response tendencies, while the other estimates reflect item-level variation in how phase, picture presence, and their interaction influence responses.

Discussion

The present research investigated the photo-truthiness effect using a novel 2-phase procedure, wherein photo exposure was temporally separated from truth judgments. Across 6 experiments, the influence of nonprobative photos on perceived truthfulness was examined.

Previous literature has consistently documented a small but reliable truthiness effect (d = 0.18 - 0.25), and the current results suggest that separating photo presentation from truth judgments does not substantially increase the effect beyond its typical magnitude.

The results across experiments replicated the established truthiness effect, with statements accompanied by nonprobative photos judged as true more often than those presented alone. However, contrary to the initial hypothesis, the 2-phase condition did not amplify this effect to a significant level within experiments. While some experiments suggested a marginal increase in truthiness in the 2-phase condition, especially experiment 6, the mini-meta-analysis across all experiments indicated that the difference between the 1-phase and 2-phase procedures was not statistically significant. However, the 2-phase condition consistently yielded slightly larger and directionally consistent effect sizes, and ceiling effects may be artificially reducing the effect. Notably, Experiment 5, which implemented a passive viewing manipulation to reduce conscious recollection of photos, failed to produce any detectable truthiness effect, highlighting the importance of source awareness in photo-induced fluency.

Item-level analyses revealed substantial variability in the truthiness effect across different claims, where some items produced large truthiness effects, and some produced falsiness. These reversed effects were more prevalent in the 1-phase condition, suggesting that immediate photo presentation may sometimes introduce skepticism rather than fluency.

The fluency account posits that photos enhance truth judgments by facilitating claim processing, leading individuals to misattribute processing ease to truth. The current findings offer partial support for this mechanism while also highlighting its limitations. The failure of the 2-phase procedure to enhance truthiness suggests that separating photos from truth judgments does not necessarily increase fluency beyond its occurrence in the 1-phase condition. If anything, the

2-phase design may reduce fluency by introducing a temporal gap, thereby limiting the photo's immediate influence on cognitive processing.

A core assumption of research on truthiness is that the images are non-probative. But the examples in Figure 23 suggest that some of the images in these studies may have been perceived as providing evidence against the claim. The response time results raise questions about whether fluency is the primary driver of truthiness or whether response time is a reliable measure of fluency. Fluency effects appear to be context-dependent, potentially interacting with factors such as pre-existing knowledge, probative value, item ambiguity, and metacognitive awareness. These findings align with prior research indicating that fluency effects are most pronounced for ambiguous or low-knowledge claims, where individuals rely more heavily on heuristic cues (Abed et al., 2017; Newman et al., 2015).

From a theoretical perspective, these findings contribute to the understanding of how nonprobative photos influence belief formation. The persistence of the truthiness effect across different procedural manipulations underscores its robustness but also suggests clear constraints on its magnitude. Attempts to enhance truthiness by reducing discounting, as in the 2-phase condition, may be ineffective due to the relatively modest baseline size of the effect and participants' ability to recognize and regulate fluency cues.

Practically, these findings have implications for misinformation research. The small but reliable influence of nonprobative photos on truth judgments highlights the need for media literacy interventions that help individuals critically evaluate photographic evidence. Given that the truthiness effect persists even when individuals may not consciously recall the source of a claim, efforts to mitigate misinformation should target the mechanisms underlying heuristic belief formation rather than relying solely on explicit source warnings.

The presence of reversed truthiness effects warrants further investigation. Understanding the conditions under which nonprobative photos decrease truth judgments could provide deeper insight into the cognitive mechanisms underlying belief formation. Future work could explore the role of item ambiguity, prior familiarity, and individual differences in metacognitive awareness in shaping truthiness effects.

Several limitations should be noted. First, although the 2-phase procedure was designed to reduce source discounting, it is possible that participants retained explicit memories of photo exposure in phase 1, limiting its effectiveness. Second, the experiments were conducted primarily with online and university student samples, which may limit generalizability. Third, the photo-truthiness effect in the 2-phase procedure was often constrained by ceiling effects.

Conclusion

The present research confirms the robustness of the photo-truthiness effect while demonstrating that separating photo exposure from truth judgments does not significantly amplify the effect. Instead, the findings suggest that fluency-based influences on belief formation operate within relatively stable constraints, with a substantial amount of the variance coming from the items themselves. The presence of reversed truthiness effects further highlights the complexity of the effect, emphasizing the need for a nuanced understanding of how visual cues shape belief formation.

Table 1. Fixed-Effects for Logistic Regression Model Capturing Variability in Response Patterns Across Levels

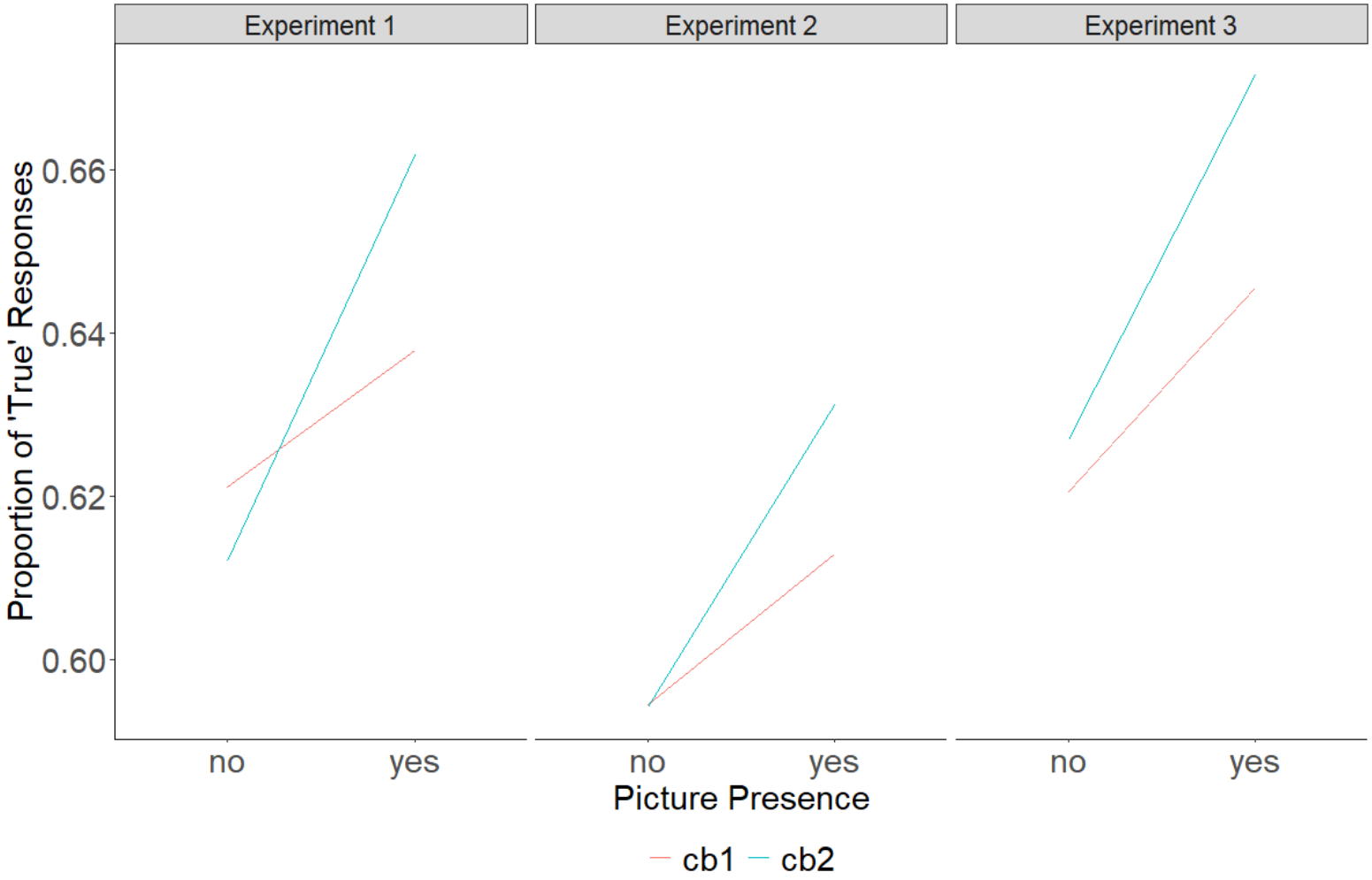
Fixed Effects Predictors	***Odds Ratio***	***95% CI***	***p***
(Intercept)	1.16	0.97 – 1.34	0.124
phase [2-phase]	2.58	2.28 – 2.90	<0.001
picture present [photo]	1.17	1.08 – 1.25	<0.001
phase [2-phase] × picture present [photo]	1.11	1.00 – 1.21	0.044

Table 2. Random-Effects for Logistic Regression Model Capturing Variability in Response Patterns Across Levels

Random Effects Parameter	***Estimate***
σ^2 (Residual Variance)	3.29
τ_{00} subject	0.62
τ_{00} item	0.34
τ_{11} subject.picture_presentphoto	0.15
τ_{11} item.picture_presentphoto	0.06
τ_{11} item.phase2-phase	0.06
τ_{11} item.picture_presentphoto:phase2-phase	0.02
ρ_{01} subject	-0.09
ρ_{01} item.picture_presentphoto	0.30
ρ_{01} item.phase2-phase	-0.64
ρ_{01} item.picture_presentphoto:phase2-phase	0.05
ICC	0.24
N (items)	56
N (subjects)	1454
Observations	81424
Marginal R^2 / Conditional R^2	0.057 / 0.281

Appendices

Appendix A. CB x Picture Interaction Plots



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