Registered Report

Negative Is True Here and Now, But Not So Much There and Then

On the Impact of Psychological Distance on the Negativity Bias

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Abstract. How do people judge the veracity of a message? The negativity bias in judgments of truth describes the phenomenon that the same message is more likely judged as true when framed negatively compared to positively. This manuscript investigates the negativity bias in conditions of psychological proximity and the possibility that the bias decreases when distance increases. This notion is informed by construal level theory, which holds that negative information is more salient and weighed more strongly in conditions of psychological proximity compared to distance. Against this background, we hypothesize that a negativity bias likely occurs in conditions of proximity. With increasing psychological distance, however, positively compared to negatively framed information is more likely to be judged true, therefore attenuating or even reversing the bias. Two studies provide preliminary yet weak support for this hypothesis. A final registered study put the preliminary conclusions to a critical test and yielded consistent results: We find a significant interaction between frame and distance, indicating a descriptive trend for a negativity bias in conditions of proximity, yet a positivity bias in conditions of distance. This interaction illustrates that psychological distance may impact the negativity bias in truth judgments.

Keywords: negativity bias, judgments of truth, construal level, psychological distance

Truthfulness is one of the cornerstones of our society. Daily interactions and communications strongly depend on our belief that other people share truths, not lies. Grice (1975) maintained that when engaging in interpersonal interactions, individuals are expected and expect from their counterpart that they follow the maxim of quality, which states that one should not say what one believes to be false and one should also not say something for which one lacks adequate evidence. At the same time, individuals are aware that not everything they are told is true, as perhaps best illustrated by the choice of "post-truth" as the word of the year 2016 (Oxford Dictionary, 2016). Post-truth is an adjective described as "relating or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal beliefs" (Oxford Dictionary, 2016) and indicates that by sending emotional and belief-centered messages, communicators might try to bring across an eventually false message.

Faced with the task of discerning truth from falsehood, individuals are known to rely on a number of cues (e.g., Dechêne et al., 2010). One of these cues is the message's frame, which may, for instance, be positive or negative. Past research has reliably demonstrated that messages framed negatively (e.g., the likelihood for bad weather is 20%) compared to positively (e.g., the likelihood for good weather is 80%) were perceived as more likely to be true (e.g., Hilbig, 2009, 2012a, 2012b). Here, we further investigate this so-called *negativity bias in truth judgments* against the background of construal level theory (CLT), which holds that negative information is more salient and weighted more heavily in conditions of psychological proximity, but with increasing psychological distance, more weight is allotted to the more central positive aspects. We hypothesize that while a negativity bias may occur in conditions of psychological proximity, it attenuates or reverses when psychological distance increases because positively framed information is weighed more strongly. In what follows, we elaborate these conjectures.

The Negativity Bias in Judgments of Truth

A wealth of evidence suggests that negative instances tend to be more influential than comparably positive ones

(Baumeister et al., 2001), an effect that applies, for instance, to everyday events, major life events (e.g., trauma), close relationship outcomes, social network patterns, interpersonal interactions, or learning processes. The authors argued that the self is more motivated to avoid bad self-definitions than to pursue good ones, and therefore, bad information is considered to be more salient and diagnostic and is processed more thoroughly compared to good information (Baumeister et al., 2001). In one study by Kahneman and Tversky (1984), for instance, participants performed different tasks in which they either lost or gained the same amount of money. The authors noted that participants reported more distress about losing a certain amount of money than joy about winning the exact same amount of money, illustrating that negative instances have a stronger impact on participants' mood than comparable positive ones. Similarly, prospect theory argues that the value function is steeper in the loss compared to the gain domain (Kahneman & Tversky, 1979). Another explanation for the "bad is stronger than good phenomenon" (Baumeister et al., 2001) stems from the observation that positive information is more similar than negative information (Alves et al., 2017; Koch et al., 2016). Alves et al. (2017) argued that negative information is more distinct than positive information, and individuals therefore benefit more from paying attention to it and weighing it more strongly in their decision-making processes.

Consistent with this general bad-is-stronger (or more distinct)-than-good tendency, Hilbig (2009) first reported that formally equivalent messages are deemed more true when framed negatively compared to positively. This bias is referred to as the negativity bias in truth judgments. In a typical experiment, participants were provided with a number of statements, which were framed either negatively, meaning that the focus was on the normatively bad outcome, or positively, meaning that the focus was on the normatively good outcome. An example for a negatively framed statement was "20% of marriages are divorced within the first 10 years," and an example for the same statement framed positively was "80% of marriages last 10 years or longer" (Hilbig, 2009). Importantly, in Hilbig's (2009) approach, the statement's outcome (and not semantic negation) determined the valence and percentages were matched between frames. After reading either a positively or a negatively framed version of each statement, participants were asked to judge the statement's truth. The results indicated that a negatively framed statement was more likely to be evaluated as true than the content-wise identical but positively framed statement (Hilbig, 2009, 2012b). Using a multinomial processing tree model, Hilbig (2012b) suggested that the bias was not driven by differences in knowledge but reflected a response bias.

But why should negative information be perceived as more true? Negative instances are more distinct (Alves et al., 2017), attract more attention (Pratto & John, 1991), and are perceived as more informative (Peeters & Czapinski, 1990), perhaps because negative instances are more rare and more threatening (Dijksterhuis & Aarts, 2003; Lewicka et al., 1992; Peeters & Czapinski, 1990). As a result, negative (bad) information may be weighted more heavily than positive (good) information (Baumeister et al., 2001). Interestingly, this differential weighing of negative compared to positive information may be particularly prominent in the here-and-now, but less pronounced in conditions of psychological distance, as suggested by CLT, as we detail next.

Construal Level Theory

CLT (Liberman & Trope, 2009; Trope & Liberman, 2003, 2010) allows for novel predictions regarding the occurrence of the negativity bias in judgments of truth, as it makes predictions about how individuals process information, and more specifically about how different pieces of information are weighed. CLT starts from the assumption that individuals live in the here-and-now but can psychologically traverse distance by thinking about the past or tomorrow, imagining being in different locations, or putting themselves in the shoes of others. The reference point for this mental traveling is the "me, here, and now" (Trope & Liberman, 2010, p. 457), and anything that is not on this zero-distance point is said to be more or less psychologically distant. Hence, an event taking place tomorrow is more psychologically distant than an event taking place today; similarly, the issues pertaining to another country are more psychologically distant than issues pertaining to one's own country or country of origin. Critically, CLT maintains that changes in psychological distance are closely associated with the level on which objects and events are mentally construed: As a general rule, psychologically distant objects or entities are construed at a higher level and psychologically more proximal entities at a lower level. To illustrate, when thinking about a forest on a low level, individuals might picture individual trees, focusing on different kinds of trees or their colors, reflecting a very concrete representation of the concept forest. In contrast, when thinking about the same forest on a high level, individuals may think about the totality of trees or the recreational and environmental opportunities a forest provides, reflecting an abstract representation.

Of particular importance in the present context are CLT's assumptions about the weighing of positive and negative information (Trope & Liberman, 2010). The theory holds that arguments in favor are superordinate to arguments against something, as the subjective importance of cons

depends on whether pros are present more than the reverse – especially when it comes to novel actions or events (Eyal et al., 2004; Herzog et al., 2007). Common examples are medical treatments: Only if a medical treatment seems beneficial (has pros), one might consider and discuss the potential negative side effects (cons). If no benefits are apparent (no pros), potential side effects seem irrelevant instead. Because the conceptual hierarchy of information matters when construing on a high level (i.e., in abstract terms), but not when construing on a low level, CLT asserts that positive compared to negative information increases in relative weight with increasing psychological distance. Evidence in support of this reasoning showed that the mental salience of positive outcomes of an action increases as social distance increases and that framing persuasive messages in terms of gains compared to losses becomes more powerful when participants make judgments for socially distant entities (Nan, 2007). Furthermore, individuals seem to evaluate both negative and positive emotional experiences as more pleasant when construing abstractly, as abstractness increases the positivity of these experiences (Williams et al., 2014). Presumably, while individuals are concerned with negative and preventional outcomes in the here-and-now (such as disappointing oneself when failing an exam), with increasing psychological distance (2 weeks before the exam), individuals also focus on positive and promotional outcomes (such as getting a high score; Pennington & Roese, 2003). Summing up, positive aspects regarding the desirability of objects or events are more strongly weighed in conditions of abstractness or psychological distance, while more pragmatic and eventually negative feasibility concerns come into play when construing more concretely and decreasing distance (Trope & Liberman, 2010).

Intriguingly, these differences in information weighing allow for the novel prediction that the relatively stronger weighing of negative compared to positive information in truth judgments as observed in the negativity bias should be particularly apparent in the here-and-now (low-level construal). With increasing psychological distance, however, the bias should attenuate (or maybe reverse), as positive information gains in weight.

Summarizing the arguments above, construal level theory suggests that there may be more to the story of the negativity bias in judgments of truth, as has previously been told. In particular, when individuals construe on a higher compared to lower level, positive compared to negative information gains in weight. Therefore, we hypothesize that with increasing psychological distance, the negativity bias should attenuate: The same information framed negatively compared to positively is likely perceived as more true in the here-and-now, but not so much in conditions of psychological distance.

The Present Studies

To test the hypothesis that the negativity bias in judgments of truth attenuates with increased psychological distance, we conducted two studies, in which we asked individuals to judge the truthfulness of different statistical statements. These statements were framed positively or negatively and either concerned participants' own country (psychologically proximal) or a foreign country (psychologically distant) to vary psychological distance (Liberman & Trope, 2008). A third and final registered study is outlined that put our preliminary conclusions to a critical test.

Study 1a (Nonregistered)

Study 1a builds upon the materials used by Hilbig (2009, 2012b). We used 20 statistical statements that were framed either positively or negatively (to manipulate valence) and concerned conditions that were psychologically proximal versus distant for our participants (to manipulate the construal level). As the dependent variable, participants judged each statement's truthfulness.

Methods

Participants

The study was conducted online and was distributed via different German-speaking and psychology-oriented groups on Facebook. The study took about 8 minutes to complete. Based upon prior research using a similar material (Hilbig, 2009), we assumed effect sizes to be medium to large. The a priori power analysis with an α error probability of .05 and a power of .85 indicated a required sample size of 52 participants (Faul et al., 2009). Fifty-eight individuals completed the questionnaire (10 males, 48 females; M_{age} = 24.95 years, SD_{age} = 4.93), with 29 participants having read positively framed statements and 29 participants having read negatively framed statements. Participants could take part in a lottery for three €10 (approximately $10) Amazon vouchers as compensation.

Design

Statements differed in regard to valence (between participants; random assignment) and psychological distance (within participants; random presentation). Valence was manipulated between participants so that message valence was not rendered salient. Distance was manipulated within participants by using different statements from previous

research (Hilbig, 2012b). In addition to the two design factors, we counterbalanced across participants the positioning of the question labels on the horizontal axis (true left, false right vs. true right, false left). This counterbalancing was not analyzed. Data were analyzed as a 2 (valence: positive vs. negative; between) × 2 (psychological distance: proximal vs. distant; within) mixed design with the statements' perceived veracity as the dependent variable.

Materials and Procedure

After providing informed consent, participants were shown one exemplary item to familiarize them with the nature of the task. Participants were asked not to use any external sources (such as Google, etc.) and to provide their best guess if they did not know the answer. The exact wording of these instructions for all studies can be found in Appendix F in the Electronic Supplementary Material, ESM 1. Following this introduction, participants were asked to judge the veracity of 20 items by rating them as *false* (coded as 0) or *true* (coded as 1). We used a set of slightly adjusted statements from Hilbig (2012b), which were provided by the author via personal communication. All statements either focused on the participants' country of residence (proximal; here: Germany) versus a faraway country (distant; here, e.g., Vietnam, Peru, Ghana). Importantly, all statements provided statistical information in terms of frequencies and not probabilities, so that the spatial distance manipulation was not confounded with hypotheticality (which may independently alter psychological distance). All statements are provided in ESM 1, Appendix A.

For exploratory reasons and following earlier research, we subsequently assessed the revised Life-Orientation-Test (Scheier at al., 1994) in its German version (Glaesmer et al., 2008), as dispositional optimism or pessimism may play a role in evaluating statistical facts (see Hilbig, 2009). Finally, participants were asked to provide demographic information, were asked for further comments about the study, and were thanked for their participation.

Results

Overall, participants judged 9.98 statements as true (about 50%; $SD = 2.50$), and individuals ranged from a minimum of 3 to a maximum of 15 statements judged as true. On the individual statement level, the average ratings of truthfulness varied from 0.31 to 0.69. Further descriptive information can be found in Table 1. Proximal and distant statements were averaged to form two separate indices.

To test our hypothesis, we calculated a mixed 2 × 2 ANOVA with valence as the between variable, distance as the within variable, and mean perceived veracity as the dependent variable. The results yielded a significant main effect for valence, $F(1, 56) = 15.50$, $p < .001$, $\eta_p^2 = .22$, reflecting that statements framed negatively were more likely to be judged as true compared to the same statements framed positively, $M = 0.56$, $SD = 0.12$, $M = 0.44$, $SD = 0.10$. Moreover, a significant main effect for distance was observed, $F(1, 56) = 8.14$, $p = .006$, $\eta_p^2 = .13$, reflecting that psychologically proximal compared to distant statements were more likely to be judged as true, $M = 0.54$, $SD = 0.16$, $M = 0.46$, $SD = 0.17$, respectively. In contrast to our hypothesis, there was no support for the predicted interaction between valence and distance, $F < 1$. Including the average Life-Orientation-Test score as a covariate into the analysis did not change the results, except for the main effect of distance, which was no longer significant, $F < 1.8$.

Discussion

Study 1a investigated whether the negativity bias attenuated with increased psychological distance, manipulated via spatial distance. Our analysis did not yield the predicted pattern of results and therefore failed to provide support for our hypothesis. To further explore the lack of an interaction effect, we inspected the results on the individual item level (see Table 1). This inspection revealed that for 4 out of 10 items in the condition of psychological proximity (statements related to Germany), no negativity bias occurred – meaning that for 40% of the items, the premise of a negativity bias in the here-and-now was not met. This finding is surprising given the bias' robustness and the finding of medium-to-large effect sizes in prior research (e.g., Hilbig, 2009). In itself, this may be considered interesting, indicating that there might be more to tell about the negativity bias in judgments of truth than known so far. With the necessary note of caution, one may further speculate that item-specifics and/or individuals' previous knowledge or expectations (see Jaffé & Greifeneder, 2019) may moderate the occurrence of the negativity bias.

Because the existence of a negativity bias in the here-and-now constitutes the logical premise for the hypothesized attenuation in psychological distance, we decided to run another study with a subset of the items used in Study 1a, focusing only on those statements that showed a negativity bias in conditions of psychological proximity. We followed this procedure as we believe that the more interesting analysis focuses on whether a negativity bias can be attenuated *given* (i.e., under the precondition) that it occurs in conditions of psychological proximity. Again, this interaction hypothesis builds on the theoretical tenet that with increasing psychological distance, individuals are more likely to put weight on positively framed information.

With this goal in mind, we conducted Study 1b using the set of five items that showed a negativity bias in the here-

Table 1. Veracity judgments (0 = false, 1 = true) for statements presented in Study 1a

		Valence (frame)						
		Negative		Positive				
Distance	Item #	*M*	*SD*	*M*	*SD*	Mean difference	$\chi^2(1)$	Exact *p*
Distant	1	0.59	0.50	0.66	0.48	− 0.07	0.29	.787
	2	0.69	0.47	0.55	0.51	0.14	1.17	.417
	3	0.41	0.50	0.48	0.51	−0.07	0.28	.792
	4	0.45	0.51	0.52	0.51	−0.07	0.28	.793
	5	0.48	0.51	0.28	0.45	0.21	2.64	.175
	6	0.48	0.51	0.14	0.35	0.35	8.06	.010
	7	0.35	0.48	0.38	0.49	−0.03	0.08	1.000
	8	0.76	0.44	0.31	0.47	0.45	11.71	.001
	9	0.45	0.51	0.31	0.47	0.14	1.17	.417
	10	0.45	0.51	0.45	0.51	0.00	0.00	1.000
Proximal	11	0.66	0.48	0.31	0.47	0.35	6.91	.017
	12	0.62	0.49	0.17	0.38	0.45	12.18	.001
	13	0.62	0.49	0.38	0.49	0.24	3.38	.114
	14	0.76	0.44	0.62	0.49	0.14	1.29	.395
	15	0.79	0.41	0.45	0.51	0.35	7.32	.014
	16	0.59	0.50	0.69	0.47	−0.10	0.67	.585
	17	0.55	0.51	0.31	0.47	0.24	3.45	.111
	18	0.48	0.51	0.55	0.51	−0.07	0.28	.793
	19	0.48	0.51	0.69	0.47	−0.21	2.56	.182
	20	0.48	0.51	0.59	0.50	−0.10	0.62	.599

and-now and five items that showed no bias in conditions of psychological distance (see Appendix A, ESM 1). While commendable because it allows for testing whether the hypothesized interaction holds in ideal conditions, this selection of items comes with a methodological caveat that we will discuss in Study 1b.

Study 1b (Nonregistered)

Methods

Participants

The study was conducted as an online study advertised as a *study on the evaluation of statements* via psychology groups on Facebook and the email pool of the online portal http://www.forschung-erleben.de, which communicates social psychological research to the German-speaking public. The study took about 7 minutes to complete. Our a priori power analysis with the assumption of a large effect size (determined when exploratorily investigating the interaction effects of the reduced set of items from Study 1a; see ESM 1), an α error probability of .05, and a power of .85 indicated a required sample size of 63 participants (Faul et al., 2009). Eighty-one individuals completed the questionnaire (19 males, 60 females, 2 no answer; M_{age} = 25.52 years, SD_{age} = 5.78), with 18 (21) participants having judged positively framed statements about distant (close) places and 21 (21) participants having judged negatively framed statements about distant (close) places. Participants could participate in a lottery for Amazon vouchers as compensation for their participation.

Design

The design was identical to Study 1a with the following exceptions: Psychological distance was manipulated between participants, and each participant read five statements only. We changed the within manipulation from Study 1a to a between manipulation in Study 1b so as to render differences between psychological distance less salient. Data were therefore analyzed as a 2 (valence: positive vs. negative; between) × 2 (psychological distance: proximal vs. distant; between) design with the averaged statements' perceived veracity as the dependent variable. Participants were randomly assigned to one of the four conditions.

Table 2. Veracity judgments (0 = false, 1 = true) for statements presented in Study 1b

		Valence (frame)						
		Negative		Positive				
Distance	Item #	*M*	*SD*	*M*	*SD*	Mean difference	$\chi^2(1)$	Exact *p*
Distant	1	0.62	0.50	0.33	0.49	0.29	3.17	.111
	3	0.14	0.36	0.78	0.43	−0.63	15.89	<.001
	4	0.48	0.51	0.56	0.51	−0.08	0.24	.751
	7	0.52	0.51	0.39	0.50	0.13	0.71	.523
	10	0.48	0.51	0.78	0.43	−0.30	3.73	.098
Proximal	11	0.57	0.51	0.10	0.30	0.48	10.71	.003
	12	0.62	0.50	0.24	0.44	0.38	6.22	.028
	13	0.38	0.50	0.43	0.51	−0.05	0.10	1.000
	14	0.71	0.46	0.62	0.50	0.10	0.43	.744
	15	0.48	0.51	0.29	0.46	0.19	1.62	.341

Materials and Procedure

Materials and procedures were identical to Study 1a, except for the reduced set of items as detailed above (see Appendix A, ESM 1).

Results

Overall, participants judged 2.36 statements as true (about 47%; $SD = 1.04$), and individuals ranged from a minimum of 0 to a maximum of 5 statements judged as true. On the individual statement level, the average ratings of truthfulness varied from 0.33 to 0.67. No statements were judged as true or false by all participants. Further descriptive information can be found in Table 2. For the subsequent analysis, we calculated a mean perceived veracity score over all five statements.

To investigate whether the negativity bias occurred in conditions of psychological proximity but attenuated or reversed in conditions of psychological distance, we calculated an ANOVA with valence and distance as independent variables and mean perceived veracity as the dependent variable. Our results yielded no significant main effects, all Fs < 2.34, ps > .130, but the hypothesized interaction between valence and distance was significant, $F(1, 77) = 16.12$, $p < .001$, $\eta_p^2 = .17$. Looking at simple main effects, the results indicated that individuals in the proximal condition judged negatively framed items to be more true compared to positively framed items, $M = 0.55$, $SD = 0.22$; $M = 0.33$, $SD = 0.18$; respectively, $F(1, 77) = 14.10$, $p < .001$, $\eta_p^2 = .16$, reflecting the expected negativity bias. In contrast, participants in the distant condition judged negatively framed items to be less true compared to positively framed items, $M = 0.45$, $SD = 0.19$; $M = 0.57$, $SD = 0.16$; respectively, $F(1, 77) = 3.84$, $p = .054$, $\eta_p^2 = .05$. Including the average Life-Orientation-Test score as a covariate yielded a significant simple main effect between negatively and positively framed statements in the condition of distance, $F(1, 76) = 4.31$, $p = .041$, $\eta_p^2 = .05$, but no changes in the overall pattern of results or the other significance levels were reported before.

Discussion

Study 1b sought to replicate Study 1a with a different sample of participants, a reduced set of items, and a between-participants instead of within-participants manipulation of psychological distance. For the present materials, we observed a negativity bias in conditions of low psychological distance, but no bias or even a reversal when psychological distance increased. These results are in line with CLT, which holds that positive information may become more influential compared to negative information in conditions of psychological distance. Of interest, close inspection of item means revealed differences between Studies 1a and 1b. Item 1 for example showed a descriptive trend for a positivity bias in Study 1a, but a trend for a negativity bias in Study 1b. Another example is the negativity bias found for Item 11, which was stronger in Study 1b than in Study 1a. We can only speculate about these differences – with candidates for explanation being item-based framing effects that vary as a function of the items selected (Study 1b used a subset of Study 1a), the change in design (from within to between in regard to psychological distance), and unknown sample differences.

At least two important caveats need to be mentioned and result in evaluating the findings from Study 1b as weak support only. First, Study 1a revealed that the negativity

bias did not show for some items. This may reflect item specificities, in the sense that the bias worked for some items, but not for others. At the same time, it should be noted that the bias has proven robust in prior research (Hilbig, 2009, 2012a, 2012b). Study 1a also did not support our hypothesis on the attenuation of the negativity bias with increasing psychological distance, while Study 1b did show support for this assumption. However, the results of Study 1b need to be treated with caution since we selected items based on the outcome of Study 1a. We believed that this caveat calls for a further study, for which we specified ex ante a new set of items and investigated whether the likelihood of judging the positively framed version increases in conditions of distance.

The second caveat of Study 1b is more fundamental: Because we chose to manipulate psychological distance via different items for proximal versus distant countries, it is conceivable that the items differed systematically on dimensions other than psychological distance (e.g., percentage rates were almost always lower for negatively framed items compared to positively framed items) and that these differences were responsible for the observed pattern of results. Study 2 was designed to address this concern, too.

Study 2 (Preregistered With *Experimental Psychology*)

Study 1b provided preliminary yet weak support for a negativity bias in the conditions of psychological proximity, but a reversal in conditions of psychological distance, consistent with the theoretical tenets of construal level theory (Trope & Liberman, 2010). However, this pattern was dependent on the existence of a negativity bias in conditions of psychological proximity. Although this precondition makes sense from a logical perspective (something that is not existent cannot be reduced), it does not necessarily follow from the more general theorizing that positively (compared to negatively) framed information is more likely to be judged as true with increasing psychological distance. In Study 2, we therefore aimed at testing the general connection between the framing of information and psychological distance, irrespective of the existence of a negativity bias in conditions of close proximity.

Going back to Studies 1a and 1b, two structural caveats inherent to both are that (a) different items were used to implement the proximal versus distal conditions and (b) both studies built on only a few items, which may forestall more general conclusions. Furthermore, in 9 out of 10 items in Study 1b, the absolute percentage rate in the item text was lower in the negative compared to the positive frame condition, which may constitute a confound.

Study 2 was designed to address these caveats and put the hypothesized reasoning to a critical test. To this end, we intensively searched for statistical facts pertaining to two different countries, one close (Germany) and one more distant (Ireland). In order to find statistical facts pertaining to both Germany and Ireland, we used websites featuring information about the two countries and the EU. We elected to focus on Germany and Ireland because Germany and Ireland are socioeconomically similar in many respects, such as both having an above EU-28 GDP and a below EU-28 average inflation rate in 2018 (eurostat, 2018), thus increasing the likelihood that we find similar statements. At the same time, construal level theory holds that for German participants, Germany-related items would be generally psychologically close and Ireland-related items would be generally psychologically distant, given the spatial distance between the countries.

We then applied the following restriction criteria: First, only facts for which we found matching content in both countries were eligible. Second, we retained only facts that differed up to a maximum of 10 percentage points between the countries (e.g., 12% of the German population do not have internet access; 11% of the Irish population do not have internet access). In combination, criteria 1 and 2 imply that the eligible facts pertained to the same statistical question for both countries but could differ up to a specified maximum of 10 percentage points. We opted for a maximum of 10 percent in order to be able to take the mean of both countries as a statistical value in all conditions without threatening perceived plausibility for either country. This resulted in identical and similarly true items for both country conditions. Third, we ensured that the items applied to the present times in order to decrease variation as a function of temporal distance. Fourth, we selected items such that we had an equal number of items in each of the four quarters of the percentage continuum. This ensured that the full item set was balanced across percentage levels, namely that one quarter of the negatively framed items were located within the range of 0–24% (76–100% for positively framed items), another quarter in the range of 25–49% (51–75% for positively framed items), the third quarter in the range of 50–74% (26–50% for positively framed items), and the final quarter in the range of 75–100% (0–25% for positively framed items).

The goal of a balanced set in Step 4 resulted in the necessity to exclude some items from some of the percentage quarters. In these cases, we retained the more general population items and discarded those that focused

on specific subgroups (e.g., facts about particular age groups, such as risk propensity in adolescence). Appendix B in ESM 1 shows the final set of 56 statements that met this set of criteria, and a translation of these statements can be found in Appendix C, ESM 1.

Valence was manipulated within participants. In Studies 1a and 1b, valence was manipulated as between factor to avoid drawing attention to the differences in framing of the statements. With 20 statements in Study 1a, and 5 statements in Study 1b, this concern seemed relevant. The situation was different with a total of 56 statements, affording a within manipulation. In fact, 56 statements of the same valence might even have created an artificial situation, which may have drawn participants' attention toward the commonalities in the framing of the statements. Participants were therefore presented with 28 statements framed negatively and 28 statements framed positively (seven statements within each range quartile). Psychological distance, however, was manipulated between participants in order to make differences in psychological distance less salient. The between manipulation, however, came with the limitation that we could not investigate potential distance effects within participants and a lower level of statistical power.

Study 2 was part of the preregistered report and received an "In Principal Acceptance" from *Experimental Psychology* on March 27, 2019, and was conducted on October 16, 2019. Materials, sample sizes, and analyses were preregistered with *Experimental Psychology*. To provide an openly accessible verbatim copy of this preregistration, we posted it on an independent host site: https://aspredicted.org/blind.php?x=he4fm7. This occurred after data collection. All materials are shared within this manuscript and the Electronic Supplementary Materials (ESM 1). The data can be accessed on the Open Science Framework: https://osf.io/2xqmk/?view_only=375840b885e344cf96c80f7a3cdb36b6.

Methods

Participants

The study was conducted as an online study advertised as a *study on the evaluation of statements* via the platform "Clickworker." Our a priori power analysis with an α level of .05, a desired power of .95 (resulting in an equally high α and β error), and a small-to-medium effect size ($f = 0.17$; as a conservative estimate for the interaction effect, given that we used new and untested statements) indicated a required sample size of 116 participants. We increased this number by 20% to reach the required sample size even if participants needed to be excluded due to prescreening criteria described below, while keeping groups balanced. We therefore requested from clickworker a sample of 140 participants, with half of the participants having read statements about Germany (psychologically proximal for German participants) and the other half participants having read the same statements about Ireland (psychologically more distant for German participants).

As we also planned to analyze our data with mixed models, we recalculated our power with PANGEA (Westfall, 2016) to analyze our setup that consists of a sample size of 116 participants (58 per distance condition) and 56 statements (28 replicates per valence condition). The analysis indicated that this setup would result in a sufficient power of > .95.[1]

The final dataset consisted of 166 participants. However, only 134 of these provided informed consent and were therefore able to participate in the study. As a prescreening criterion, we required all participants to live in Germany. Participants who did not give consent were screened out from the survey. Additionally, eligible participants were asked to indicate whether they saw any reason as to why their data should not be used for statistical analyses at the end of the study. If they had asked for exclusion, we would have not used their data for the analysis (no participants made use of this option). As all participants who provided informed consent answered all questions within the study and nobody indicated reasons not to use their data, the resulting sample consisted of 134 participants (67 in each distance condition) with 84 males, 49 females, and 1 no information (M_{age} = 37.84, SD_{age} = 11.85). For an estimated participation time of 15 minutes, participants received €2.25 (approximately $2.25) as compensation.

Design

Our study built on a 2 (valence, within factor, random assignment) × 2 (distance, between factor, random assignment) mixed design. In addition to the two design factors, we counterbalanced across participants the positioning of the question labels on the horizontal axis (true left, false right vs. true right, false left). This counterbalancing was not analyzed. Perceived veracity over 56 items, grouped according to the within-participants manipulations, served as the dependent variable.

[1] PANGEA (Westfall, 2016) has been developed for continuous outcome variables; therefore, this power analysis for a categorical outcome can only be understood as an approximation and should be interpreted with caution.

Materials and Procedure

The materials for Study 2 were 56 newly created statements that can be found in ESM 1, Appendix B. The procedure was the same as in Studies 1a and 1b, except for the fact that the same and equally plausible content was presented in statements in the proximal and distant conditions (close condition: Germany vs. distant condition: Ireland). Different to Studies 1a and 1b, the revised Life-Orientation-Test (Scheier et al., 1994) was not assessed. At the end of the study, we exploratorily assessed the perceived similarity between Germany and Ireland, participants' familiarity with Germany/Ireland, and how much participants cared for the content of the statements (Likert scales, 1 = *very similar/very familiar/not at all* to 7 = *very different/not familiar at all/very much*). Furthermore, we assessed demographic information (gender, age) and if participants saw any reason as to why we should not use their data. Finally, participants were thanked for their participation.

Results

Confirmatory Analyses

Overall, participants judged 34.54 statements as true (about 62%; SD = 6.56), with a range of minimally 14 to a maximum of 50 statements judged as true. Descriptively, statements framed negatively compared to positively were not more likely to be judged as true, M_{neg} = 17.12, SD_{neg} = 3.96; M_{pos} = 17.42, SD_{pos} = 4.44. On the individual statement level, the average ratings of truthfulness varied from 0.31 to 0.78. No statements were judged as true or false by all participants. Further descriptive information can be found in Appendix E in ESM 1.

To investigate whether the negativity bias attenuated or reversed in conditions of psychological distance, we calculated a 2 × 2 ANOVA with average judgment of truth as a dependent variable (mean across binary truth ratings) and valence and psychological distance as independent variables. With this analysis, we investigated the main effects of valence and distance and analyzed whether a negativity bias occurred. Furthermore, we investigated the interaction effect between valence and distance to test our hypothesis. The results indicated no significant main effect for valence, $F(1, 132) = 0.44$, $p = .507$, $\eta_p^2 = .00$, nor for psychological distance, $F(1, 132) = 2.79$, $p = .097$, $\eta_p^2 = .02$. However, the predicted interaction effect between valence and psychological distance was significant, $F(1, 132) = 4.97$, $p = .028$, $\eta_p^2 = .04$. We used simple main effect analyses to disentangle this interaction effect. Simple mains for the low-distance condition (items pertaining to Germany) indicated that descriptively, mean truth ratings for negatively framed statements were higher than for positive statements, $M_{neg} = 0.65$, $SD_{neg} = 0.14$; $M_{pos} = 0.62$, $SD_{pos} = 0.16$; $F(1, 132) = 1.22$, $p = .271$, $\eta_p^2 = .01$. In contrast, participants in the high-distance condition (items pertaining to Ireland) were significantly more likely to judge the positively compared to negatively framed statements as true, $M_{neg} = 0.58$, $SD_{neg} = 0.13$; $M_{pos} = 0.62$, $SD_{pos} = 0.16$; $F(1, 132) = 4.19$, $p = .043$, $\eta_p^2 = .03$.

In addition to the analysis based on aggregated indices, we used the lme4 package (Bates et al., 2014) to calculate a mixed-effects analysis for binomial distributions with judgment of truth as a dependent variable. Valence (contrast coded as −0.5 = *positive frame* and +0.5 = *negative frame*) and psychological distance (contrast coded as −0.5 = *high distance* and +0.5 = *low distance*) and the interaction were included into the model as fixed effects. As random effects, we specified intercepts for participants and statements, as well as by-participant random slopes for the effect of valence, and by-statement slopes for valence and distance. We did not include by-statement slopes for the interaction between valence and distance due to convergence problems and did not include correlations between random effects, as model comparisons indicated that they did not significantly increase the variance explained. In doing so, we followed the procedure suggested by Bates et al. (2015) and reduced the complexity of the model by eliminating random effects that explain only little variance.[2] With the help of this analysis, we could determine to what extent our findings likely generalize to other samples of participants and statements. The output of the mixed model is presented in Table 3. When controlling for random effects, we found the predicted interaction effect.

[2] The detailed estimation procedure was as follows: We started with the estimation of the full model including valence and distance and the interaction as main effects and by statements and by participants intercepts as well as by-participant random slopes for valence, and by statement random slopes for valence, distance, and the interaction as random effects. This model did not converge. We then switched from the maximal to a zero-correlation parameter model (Bates et al., 2015), which, however, did not converge as well. In the next step, we used a principal component analysis to check the model parameters and identified that the by-statement random slope for the interaction effect between valence and distance explained the least variance. We omitted this random effect and calculated the model, which now converged. We then added the correlations between random effects back into the model and compared the converging model with zero-correlation parameters to the model without zero-correlation parameters. The model comparison was not significant, $\chi^2(4) = 8.94$, $p = .063$. We therefore use and present the zero-correlation parameter model in the results section.

Table 3. Summary of fixed effects of logistic mixed model in Study 2

Fixed effects	Estimate	SE	*z*-Value	*p*-Value
Intercept	0.54	0.06	8.38	<.001
Valence	−0.04	0.14	−0.26	.796
Psychological distance	0.16	0.10	1.68	.094
Valence × Psychological distance	0.33	0.15	2.15	.031

To investigate the cell means estimated based on this mixed model, we used the emmeans package (Lenth, 2020). This descriptive calculation suggested the presence of a positivity bias in the distant condition, M_{neg} = 0.59, SE_{neg} = 0.03, 95% CI 0.53, 0.64; M_{pos} = 0.64, SE_{pos} = 0.03, 95% CI 0.58, 0.69, yet a negativity bias in the closeness condition, M_{neg} = 0.67, SE_{neg} = 0.03, 95% CI 0.61, 0.71; M_{pos} = 0.64, SE_{pos} = 0.03, 95% CI 0.58, 0.69. Simple contrasts, however, indicated that both differences are not significant, *z*-ratio = 1.25, p = .211, for the distant condition and *z*-ratio = −0.79, p = .430, for the closeness condition.

Preregistered Exploratory Analyses

In an exploratory fashion, we investigated whether perceived similarity between the two countries, country familiarity, and how much participants cared about the content of the statements influenced the results. To this end, we included these variables as covariates into the ANOVA. However, including the covariates did not change the results. While the main effect for valence, $F(1, 128)$ = 0.30, p = .585, η_p^2 = .00, and for psychological distance, $F(1, 128) = 2.34$, p = .128, η_p^2 = .02, remained nonsignificant, the interaction term between the two was significant, $F(1, 128) = 4.62$, p = .034, η_p^2 = .04. None of the covariates significantly predicted the likelihood of judging a statement as true, all Fs < 0.77, ps > .384.

Furthermore, we investigated the impact of the covariates with a focus on the distant condition (statements about Ireland). Within this condition, we analyzed whether the weighting of positive compared to negative information and the resulting judgments of truth was moderated by (a) perceived similarity in comparison to Germany, (b) familiarity with Ireland, and (c) caring about the statements' content, as all three aspects may have potentially impacted perceived psychological distance and therefore the effectiveness of our manipulation. We did not anticipate impacts in the closeness condition and therefore preregistered the analysis for the distant condition only. To investigate potential moderation effects in the distant condition, we calculated an individual difference score by subtracting truth judgments for negatively framed statements from truth judgments for positively framed items to mirror the differential weighing of the information. We then calculated a linear regression model with individual difference scores in truth judgments as a dependent variable and perceived similarity, familiarity with Ireland, and caring about the statements' content as independent variables. Neither the regression model, $F(3, 63) = 0.57$, p = .640, nor the variance that the individual predictors explained (similarity: β = .07, $t(63)$ = 0.57, p = .571; familiarity: β = −.13, $t(63)$ = −0.95, p = .344; caring: β = .14, $t(63)$ = 1.05, p = .299) were significant. This analysis suggests that the observed positivity bias cannot be related to perceptions of similarity, familiarity, or interest with Ireland. With the necessary level of caution, this analysis may be interpreted as support for the hypothesized process that indeed changes in construal level produce the observed positivity bias.

Further Exploratory Analyses (Not Preregistered)

To not only include the covariates of perceived similarity, familiarity with Germany, familiarity with Ireland, and caring about the statement's content into the ANOVA but into the mixed model, too, we reran the mixed-effects analysis for binomial distributions and added the *z*-standardized variables as fixed effects into the model. Table 4 summarizes the results, which speak to the stability of the significant interaction term, even when including potential covariates.

Discussion

Looking at the descriptive results from Study 2, we observed a negativity bias in conditions of proximity (when German participants evaluated statements pertaining to Germany) and a positivity bias in conditions of psychological distance (when German participants evaluated statements pertaining to Ireland). When using inferential methods to analyze the data, we find a significant interaction effect between distance and valence, which remains present, even when controlling for the item- and

Table 4. Summary of fixed effects of logistic mixed model including covariates in Study 2

Fixed effects	Estimate	*SE*	*z*-Value	*p*-Value
Intercept	0.54	0.06	8.41	<.001
Valence	−0.04	0.14	−0.26	.797
Psychological distance	0.16	0.10	1.59	.113
Valence × Psychological distance	0.33	0.15	2.15	.031
Similarity	−0.05	0.05	−1.02	.306
Familiarity with Germany	0.01	0.05	0.29	.771
Familiarity with Ireland	−0.02	0.05	−0.40	.688
Caring	−0.01	0.05	−0.16	.876

participant-specific effects. While the descriptive differences in means illustrate the trend, the significant interaction effect provides support for our hypothesis that psychological distance impacts the negativity bias in truth judgments.

We further note that the negativity bias in conditions of proximity and the overall main effect of valence were not significant, suggesting that the present study did not provide support for the notion that negativity may generally increase perceived truth. While this is inconsistent with earlier research (Hilbig, 2009, 2012a, 2012b), it should be noted that there may still be (unknown) item specificities that differentiate the items used in earlier work from ours. Very carefully, however, we conclude that the general notion that negative compared to positive is more likely to lead to the perception of truth might be less general than previously assumed (see also Jaffé & Greifeneder, 2019).

General Discussion

This manuscript investigates how negative versus positive framing of information impacts judgments of truth. In Study 1a, participants judged 20 statements, half pertaining to their home country and half pertaining to a country abroad, so that the statements differed in spatial (and therefore psychological) distance. Moreover, the statements were all framed either negatively or positively. In Study 1a, analyses yielded a significant main effect for psychological distance and a significant main effect for valence (a negativity bias), but no interaction between the two variables. Inspection on the item-level revealed, however, that even descriptively a negativity bias was not observed for 4 out of 10 items in the proximate condition, although previous research indicated a stable effect in conditions such as these (Hilbig, 2009, 2012a, 2012b). As our interest focused on an attenuation of the negativity bias in the distal condition given its existence in the proximal condition, Study 1b relied only on those Study 1a statements that had shown a negativity bias in the proximal condition. With this selective item set, Study 1b yielded an interaction effect of valence and psychological distance. In particular, we observed a negativity bias in the low-distance condition, but a descriptive trend for a positivity bias in conditions of high-distance. While consistent with the suggested interaction hypothesis, the selection of items for Study 1b harbors caveats that needed to be addressed with a new, well-powered study. Study 2 was preregistered with the journal and was based on a new set of statements. This new set of items allowed holding the statements' content stable across conditions of psychological distance; moreover, the items were equally spread across the range of percentages. Consistent with Study 1b, Study 2 again revealed the predicted significant interaction effect between psychological distance and valence on judgments of truth. Looking at the data with mixed models supported the finding of a significant interaction effect. Although contrasts were mainly present as descriptive trends, this interaction effect provided support for our hypothesis, even when controlling for perceived similarity between the countries in the different distance conditions, familiarity, and caring about the statements content.

Outlook on the Negativity Bias in Judgments of Truth

The results of the presented studies speak to potential moderation effects of the negativity bias in judgments of truth. In this manuscript, we argue that it is important to consider psychological distance, represented by spatial distance, as it might attenuate or even reverse negativity bias effects. This result indicates that the negativity bias in judgments of truth might be more malleable than previously thought. Interestingly, we also found that a negativity bias was present for some items, but not for others (see Tables 1 and 2). As noted above, this may reflect item specificities, in the sense that the bias works for some items, but not for others. Against the background of the present findings, one might speculate that these item specifics are a function of psychological distance itself. If the content of an item is very relevant to individuals, it is likely psychologically close. In contrast, if the content of an item is not relevant, it might be psychologically distant.

Limitations and Further Research

One limitation of the present studies is that psychological distance was varied along the spatial distance dimension only, with one example only, namely by substituting Germany with Ireland. As described above, we chose Ireland because it may be expected to be psychologically more distant for the German participants and at the same time share many structural similarities with Germany. In contrast to the suggested effect of psychological distance, one could alternatively argue that Ireland is generally viewed very positively by German participants. From this alternative perspective, the positivity of Ireland and not the distance might have resulted in a differential judgment of positively versus negatively framed information, as the positive image of the country might have led participants to be more likely to believe that positive

information is true. This alternative explanation awaits empirical substantiation. Next to aspects of the manipulation used in our work, future research could also manipulate other forms of psychological distance, namely time, social distance, or hypotheticality. We speculate that similar results will be obtained for all distance dimensions, as there is a strong consensus among researchers that all different distance dimensions converge in one underlying dimension (Fiedler et al., 2015; Trope & Liberman, 2003, 2010).

Future research could also investigate if the conceptually same pattern of results was obtained if one used the translated version of our statements (see Appendix C, ESM 1) and ran a replication of Study 2 with Irish instead of German participants. This would allow testing whether the very same statements that have now been used to create the high-distance condition (i.e., statements about Ireland evaluated from the perspective of German participants) could produce a negativity bias when they constitute the low-distance condition (i.e., statements about Ireland evaluated from the perspective of Irish participants). This would provide further support that there is nothing peculiar about the respective statements, but that psychological distance to the evaluated content determines whether information framed as positive or negative is weighted more strongly.

Conclusion

The Oxford Dictionary (2016) has argued that a new political era has emerged in the 2016 US-presidential campaign and the first Brexit vote, in which facts and fiction blur. In this climate, understanding biases related to judgments of truth has become more important than before. It is therefore highly relevant to better understand when and why individuals judge a message to be true or not, in order to equip those who combat fake news with useful and effective strategies. The present findings show that the negativity bias in judgments of truth might be sensitive to specific contexts and circumstances and might attenuate or even reverse by increasing psychological distance.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/1618-3169/a000493

ESM 1. Appendices A–C: Overview on translated items used in Studies 1a, 1b, and 2. Appendix D: Add-on to Study 1a. Appendix E: Summary of statistics per statement in Study 2. Appendix F: Original and translated instructions for the truth judgment task for Studies 1a, 1b, and 2.

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Open Data
Materials, sample sizes, and analyses of Study 2 were preregistered with *Experimental Psychology* on an independent host site: https://aspredicted.org/blind.php?x=he4fm7. All data for Study 2 can be accessed on the Open Science Framework https://osf.io/2xqmk/?view_only=375840b885e344cf96c80f7a3cdb36b6.

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