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Unmasking Conspiracy Thinking: A Masked Priming Study Testing Belief-Based versus Communication-Based Conspiracy-Theory Endorsement

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Abstract

Conspiracy theories have become increasingly prevalent in recent years, posing a threat to a democratic discourse. This study investigates whether conspiracy beliefs are internalized and automatically activated (belief-based hypothesis) or strategically used and context-dependent (communication-based hypothesis). Using a masked priming paradigm, 80 participants were presented with conspiracy- or science-related primes, followed by self- or other-referential targets. Reaction times (RTs) and accuracy were recorded, and explicit conspiracy beliefs were assessed using the Generic Conspiracist Beliefs Scale. No priming effects indicative of the belief-based theory were found. This was also supported by additional analyses, with participants divided by median-split into two groups (conspiracy believers versus non-believers). These results provide no evidence for automatic semantic alignment between conspiracy content and the self, as would be expected under the belief-based hypothesis.

Keywords

Conspiracy, Masked Priming Paradigm

1. Introduction

The spread of conspiracy theories and fake news goes hand in hand with individuals' undermined views of democratic institutions, rational discourse, and political decisions (e.g., Nefes, 2015; van Prooijen, 2019; Sutton & Douglas, 2020; Van Mulukom et al., 2022; but see, e.g., Coady, 2007). Thus, from the perspective of

democratic societies and for the sake of rational decisions, interventions aimed at stopping the spread of false claims at an individual level are warranted. However, to create successful interventions against the spread of or belief in conspiracy theories at an individual level, one first needs to understand the root causes for an individual's inclination toward (the belief in or at least the spread of) conspiracy theories and fake news, in the following, abbreviated as conspiracy inclination, while avoiding circular reasoning by explaining that a conspiracy inclination is preceded by a conspiracy mentality, or that a conspiracy mentality is simply defined as a disposition to conspiracy inclination (black box explanation) (Nera, 2024). In the present study, we addressed this question with the aim of discerning between two major conceivable causes of conspiracy inclinations that are not necessarily mutually exclusive alternatives. These two (larger pools of more detailed) explanations for conspiracy inclination are very different in terms of their consequences for fitting interventions, so it is important to understand which of these explanations is likely true.

The first possible explanation is that individuals with a conspiracy inclination believe in these theories (Sutton & Douglas, 2020). According to the needs framework, epistemic, existential, and social needs foster the inclination to believe in conspiracy theories. For instance, to meet a need for social affiliation with an in-group to which a person belongs, the person might believe in a conspiracy theory that is held true by the in-group, or to meet an epistemic need for certainty in situations of uncertainty and crisis, a person might believe in a conspiracy theory offering information and, thus, more certainty regarding possible solutions of the crisis (e.g., Douglas et al., 2019; Douglas & Sutton, 2023; for a meta-analysis, see Biddlestone et al., 2025). Partly aligned with the needs framework, researchers have also named and identified diverse human dispositions that might be related to an individual's belief in conspiracy theories (e.g., Bowes et al., 2023; Imhoff & Bruder, 2014; Van Mulukom et al., 2022). For example, weaknesses in information processing were made responsible for an individual's belief in conspiracy theories (Gjoneska, 2021; Miller, 2020; Swami et al., 2014). If the belief hypothesis—as we will call this explanation in the following—holds true, a fitting intervention would, for example, have to work on the information processing capacities of the affected individuals as well as having to deliver more valid information in a recipient-appropriate manner (e.g., in simple language, with repeated emphasis on important content, etc.).

A second possible explanation, however, does not necessarily require that spreaders of falsehoods and conspiracy theories believe in these theories. According to this second, alternative possibility, spreaders of falsehoods and conspiracy theories are lying—that is, advocates of conspiracy theories would know, understand, and even believe in a valid truth different from what they say, write, display, etc. For example, politically motivated reasoning could serve the individual's truth-independent goal of identity protection (e.g., Kahan et al., 2017). In line with a deliberate identity-protection purpose, cognitive reflection as an individual dis-

position to engage in conscious and effortful processing boosted rather than mitigated the display of ideologically motivated cognition (Kahan, 2013). According to this communication hypothesis, instead of expressing their true belief, as in an assertive speech act, an individual with a conspiracy inclination would strategically spread misinformation through alternative communicative (e.g., illocutionary and perlocutionary) speech acts and, thus, for other purposes than expressing their true beliefs such as for elicitation of emotions among the recipients (e.g., provoke anger towards political enemies, and, at the same time, create bonds with the recipients of the message that are based on shared hostilities towards the political enemy), declare a state or event (e.g., declare a highly regarded scientist a charlatan because their arguments do not align with the liar's interests), or expressing an attitude (e.g., express the despise for the views of an expert) (see, e.g., Searle, 1979, for the discrimination of different types of speech acts). In line with this view, humans sometimes show partisan cheerleading or partisan bias, where individuals talk more favorably about their own political party as long as it suits their narrative, but are very much capable of differentiating between true and false statements about their own and opposing parties if there is a monetary incentive (Bullock et al., 2015; Prior et al., 2015; Schaffner & Luks, 2018).

Of course, beliefs in and communication of conspiracy theories and false claims could also be interdependent and foster each other. For example, to create more than a stir or a provocation on the side of the receiver and convince the receiver of a conspiracy theory, some type of belief in the theory would be required on the side of the receiver, even if the sender would be aware of the falsehood of the theory. However, the important upshot of the theoretical possibility of independence of the belief hypothesis and of the communication hypothesis would be that the respective reasons for the spread and sharing of false beliefs would require different interventions. On the one hand, if the belief hypothesis holds true, a fitting intervention could consist in inoculation against these false beliefs (e.g., Lewandowsky & van Der Linden, 2021). On the other hand, if the communication hypothesis holds true, a fitting intervention would, for example, require the creation of novel avenues to negotiate different interests in a less aggressive or (e.g., for democratic institutions or constitutions) less damaging way (Voelkel et al., 2024).

As should be clear from the above, both the belief and the communication hypothesis correspond to pools of alternative explanations rather than one very specific explanation alone. For example, variants of the belief hypotheses may put the emphasis on intellectual factors (e.g., a cognitive style; cf. Swami et al., 2014) or on personality traits (e.g., dark tetrad traits such as Machiavellism; cf. Bowes et al., 2023) as a favorable precondition for building a belief in conspiracy theories. Likewise, different intentions and different speech acts may be responsible for the spread of conspiracy theories or misinformation. For example, spreaders of conspiracy theories may want to elicit emotions (e.g., provoke anger; cf. Madisson & Ventsel, 2020; Sunstein & Vermeule, 2008) or to provoke violence (Hebel-Sela et al., 2022; Jolley et al., 2022).

Importantly in the context of the current study, the communication hypothesis presupposes some type of consciousness of the false claims to support their intentional or strategic usage by the sender. This is most clearly expressed in Kahan's (2013) partisan-cheerleading account that links an individual's advocation of conspiracy theory to conscious and effortful processing (as in System-2-type processing à la Kahneman, 2011). In the current study, we, therefore, used two types of measures to test if an individual's conspiracy inclination reflected their beliefs. We did so by contrasting the outcomes of an explicit measure of communicated or believed conspiracy theories with those of an implicit measure that should be sensitive to believed conspiracy only. Here, we followed the logic of implicit attitude research that assumes that an individual's true attitudes and beliefs can be reflected in automatic processing, even awareness-independent processing (e.g., Fazio & Olson, 2003; Greenwald et al., 1998). Thus, we expected that the two measures aligned if the belief hypothesis were true.

As an explicit measure, we used an established questionnaire that allowed our participants to express their belief in or attitude towards conspiracy theories. To that end, we used the Generic Conspiracist Beliefs (GCB) Scale (Brotherton et al., 2013). The aim of the questionnaire—to measure a participant's inclination to express that they believe in a conspiracy theory—is transparent to the participants through the very questions contained in the questionnaire. Thus, participants could express their true beliefs or they could respond according to their typical communicative intentions. Therefore, the GCB provided us with an explicit measure of one's belief in conspiracy theories.

As a contrastive implicit measure, we used a masked priming task, in which a task-relevant target stimulus is preceded by an evaluative prime that is presented very briefly (in our case 35 ms) and the visibility of which is further compromised ("masked"). To ensure participants' unawareness of the primes, we used forward- and backward masks: one pattern presented before and the other after the prime, respectively. Prior research showed faster processing in congruent prime-target conditions, when prime and target fit semantically well to one another (e.g., the prime word "hen" before the target word "egg"), compared to incongruent prime-target conditions, where the corresponding semantic fit is lower (e.g., the prime word "hen" before the target word "fire"), even when participants were unaware of the prime and could not report its identity with above-chance accuracy (Fazio et al., 1986; Greenwald et al., 1996; Kiefer, 2002; Rohr & Wentura, 2021). In the current study, per each trial of this experimental protocol, participants had to categorize a clearly visible target word as concerning either themselves (e.g., the word "I") or someone else (e.g., the word "they"). Per each trial, prior to the visible target and unbeknownst to the participants, we presented a masked and, thus, barely visible (i.e., liminal, on the threshold of visibility) and difficult-to-notice priming word. This prime was either a word from the semantic sphere of conspiracy theories, or it was a word that denoted a concept from the scientific domain. By orthogonally crossing of the prime- and target-word categories across trials of

the experimental protocol, per each trial, participants were unforeseeably and equally likely presented with a conspiracy-related prime prior to a self-target or prior to an other-target, or with a scientific prime prior to a self-target or prior to an other-target. Critically, humans process the semantic content (or meaning) of difficult and even impossible-to-see masked primes (e.g., Carr & Dagenbach, 1990; Marcel, 1983; Kiefer, 2002; Martens et al., 2011; Van den Bussche et al., 2009). For example, presenting the word "chair" as a meaning-congruent masked prime prior to the visible target word "table" facilitates the categorization of the target as a word (vs. a non-word) in comparison to the presentation of a meaning-incongruent masked prime such as the word "net" before the same target "table" (Kiefer, 2002). Thus, even though the participants are not required to process the masked prime to solve the target-categorization task, we expected that conspiracy-related masked primes facilitated self-responses through semantic congruence only among those of our participants who believed in conspiracy theories. Only these participants would semantically associate conspiracy theories with their views and ideas of themselves. Here, it is important to note existing links between an individual's negative attitudes toward out-groups (here, towards conspiracists) and the same individual's social identity (cf. Tajfel & Turner, 2004; Turner et al., 1979). Among the believers, this facilitation in semantically congruent conditions should be found in comparison to semantically less congruent (or incongruent) pairings of masked conspiracy-related primes presented prior to other targets.

Importantly, from the perspective of the communication hypothesis, we did not necessarily expect that participants with a conspiracy inclination according to the explicit measure showed a congruence effect based on masked conspiracy-related primes before self-targets (compared to science-related primes before self-targets). The reason is that, according to the communication hypothesis, all participants could theoretically hold the same beliefs. In addition, if partisan-cheerleading theory holds true, participants' awareness of the information in question—here, of the conspiracy-related primes—would be a favorable if not even necessary, precondition for the strategic usage of this information in the expression of a partisan viewpoint (Kahan, 2013). In other words, if the communication hypothesis holds true in a version that is independent of held beliefs and requires conscious insight and strategic effort, we expected a weaker semantic association or no association between the self-concept (i.e., the self-targets) and conspiracy-related concepts (i.e., conspiracy-primes) even among persons that showed a conspiracy inclination in the explicit measure.

In addition, we had no clear predictions regarding correlations of explicit and implicit measures for science-related prime and for the participants who, according to our explicit measure, showed less conspiracy inclination. In general, science-related priming can enhance moral behavior (Ma-Kellams & Blascovich, 2013; Yilmaz & Bahçekapili, 2015). However, this has never been tested with masked primes. In addition, with respect to the present study, a high or low score on the GCB does not necessarily imply that a participant had a strong or weak

self-relevant attitude towards scientific concepts. Likewise, whether an other-target would show a semantic congruence effect with preceding conspiracy-primes or with science-primes probably depended on which person(s) a participant thought of when categorizing other-targets—a person with a conspiracy-inclination, yes or no. Thus, it was difficult to predict any semantic congruence effect for the other-targets, too.

In summary, we hypothesized that only participants with a belief-based conspiracy inclination would show a semantic congruence effect based on masked conspiracy-primes before clearly visible self-targets relative to masked science-primes before visible self-targets. In an analysis of the masked priming task, this would show up as an interaction of the between-participants variable conspiracy inclination (measured via GCB; above vs. below the median score), and the two within-participant variables prime type (conspiracy- vs. science-prime) and target type (self- vs. other-target). However, the belief hypothesis would also be in line with a simple two-way interaction of prime type and target type in the masked priming task if all participants showed (relatively) high scores of conspiracy inclination on the explicit measure or if participants falsely expressed their non-belief in conspiracy theories in the explicit measure (e.g., because participants thought that in an experiment conducted at a university, declaring their non-belief in conspiracy theories would have been a socially more acceptable response). In contrast, a different interaction (e.g., due to a selective semantic congruence effect based on science-primes before self- but not before other-targets) or no interaction might be observed if one version of the communication hypothesis holds true—communication of conspiracy-related content without a corresponding belief or partisan cheerleading. However, this does not mean that no observed interaction is equivalent to the communication hypothesis holding true. To confirm this, further testing would be necessary.

Besides the explicit and implicit measures of major theoretical interest, the current study also included various control measures. First of all, in a final block, we administered a prime-visibility task. Here, we presented masked primes and unmasked primes, and participants had to categorize the primes as either conspiracy-related or science-related. This was done to ensure that participants' awareness of the meaning of the masked primes (as conspiracy-related vs. science-related) was indeed decreased in comparison to participants' awareness of an unmasked and, thus, clearly visible prime word. Therefore, we expected that participants were better at categorizing unmasked primes than masked primes.

Second, in another block of the priming task, we used unmasked primes instead of masked primes. This was done to see if the expected interaction (based on a congruence effect between conspiracy-primes and self-targets) among the believers in conspiracy theories was maybe also found with the unmasked primes. Critically, however, prime type and target type were orthogonally crossed in all priming tasks: masked and unmasked conditions. Thus, prime types were never predictive of the most likely target category. With unmasked primes, when partici-

pants see the prime and, thus, become aware of the nonpredictive relationship between prime- and target-category, past studies have sometimes found that participants successfully suppressed prime processing (e.g., Ansorge et al., 2013; Kinoshita et al., 2011; see also Cheesman & Merikle, 1986). This is due to the fact that the prime would equally often predict the correct target response and the incorrect target response, such that suppression of a clearly visible prime serves task performance. This is different from the masked priming conditions, in which participants do not show this type of task-specific prime suppression because participants do not see the primes and, thus, are also not aware of the primes' nonpredictive nature. In conclusion, in the unmasked priming task, we did not have precise a-priori prediction about the conspiracy-based congruence effect and the interaction (between prime type and target type) among the participants with a conspiracy inclination.

Third, and finally, we included a control version of the masked-priming task. In this control task, we used the same words as prime words that we used as target words. Again, masked prime types (here, self-related vs. other-related) and clearly visible target types (self-targets vs. other-targets) were orthogonally crossed, with the exception that prime and target could never be the exact same word within a trial. As a consequence, in the control version of the masked-priming task, primes and targets could again be either congruent (e.g., a self-prime before a self-target) or incongruent (e.g., an other-prime before a self-target). In this control version of the masked priming task, we expected a congruence effect, with facilitated responses under congruent relative to incongruent conditions. This control version of the masked-priming task was run to test if we could measure a congruence effect under masked conditions at all. This is important because, as explained above, under the perspective of one of two versions of the communication hypothesis, a congruence effect might not be found in our major implicit measure: the masked priming task proper. The control version of the masked-priming task, thus, ensured that the chosen protocol of our implicit measure was at least theoretically sensitive enough to reveal a congruence effect if the necessary preconditions for this effect were given.

2. Methods

2.1. Participants

The study included a total of 80 participants, mostly students of the University of Vienna, plus a small convenience sample of participants that happened to learn of the study through personal contact with the researchers. An a-priori power analysis was conducted to determine the required sample size for the planned statistical analysis. The analysis was based on a repeated-measures analysis of variance (ANOVA), including within-participant and between-participants interactions assuming a small effect size ($f = 0.15$), striving for a statistical power of 0.8, and allowing an alpha error of 0.05. Based on these parameters, a total of 64 participants was required to achieve the predefined level of statistical power. Including

a possible loss of data, we opted for 80 participants for the final analysis. The majority of participants were between 19 and 25 years old (82.5%), some were between 26 and 30 years old (13.75%), and a few were 18 years old (2.5%), or between 30 and 40 years old (1.25%). Regarding gender, 72.5% identified as female (n = 58), 25% as male (n = 20), and 2.5% as other (n = 2). Participants were treated in accordance with the declaration of Helsinki, and informed consent was obtained from all participants prior to participation in the study.

2.2. Apparatus

Tasks were administered via a 31 cm × 28.5 cm monitor (resolution: 1920 pixels × 1080 pixels; 60 Hz screen refresh rate; screen brightness 138 cd/m^2). Participants were seated in front of the monitor, with their gaze straight ahead, centered on the screen (with a viewing distance of 60 cm).

The experiment was conducted in a dimly lit room, where the only relevant illumination was through the monitor. The software used for the stimulus presentation was OpenSesame version 3.3.14. Within this software, stimulus size was set to 60px using the "mono" font.

2.3. Study Design

The study consisted of three parts. It included a short demographic questionnaire (asking for gender and age) and the Generic Conspiracist Beliefs Scale (GCB; Brotherton et al., 2013), as a subjective measure of conspiracy inclination, a priming task with masked and unmasked primes, in which at least the masked condition served as an objective measure of conspiracy inclination, and, for a subset of the participants only, a visibility test, in which we ensured that there was a difference in the visibility or participants' awareness of the masked versus unmasked primes. The entire experiment took approximately 45 - 50 min per participant.

Participants first answered the demographic questions and, next, the GCB. The priming protocol was essentially the same for each subtest. Per each trial of the masked condition, participants were presented with a fixation cross in the middle of the screen for 750 ms, followed by a forward-mask for 200 ms, then a prime for 35 ms, a backward mask for 35 ms, and a target for 200 ms, see **Figure 1**. Participants were then asked to respond by pressing either the "F" key or the "J" key on the keyboard, depending on whether the target was self-referential (e.g., in German: "mein", "mich", "meiner", etc.) or other-referential (e.g., in German: "ihre", "andere", "fremd", etc.). Per each trial, a single prime was drawn from a list of 93 conspiracy-related words and 93 science-related words, while a single target word was drawn out of a pool of 10 self-referential words and 10 other-referential words. For half of the trials, conspiracy-related words were chosen as primes, while the other half was made up of science-related word primes, leaving us with about a 1.7% chance for each word to be picked at random. Each prime word was depicted at least once. The latter was also true for the self-referential or other-referential targets, where each had a 16% chance to be picked at random on each

trial. The average word length of conspiracy-related primes was about 12 letters, while the average word length of the science-related primes was about 13 letters. Masks consisted of a string of random block letters of the length of the longest prime word.

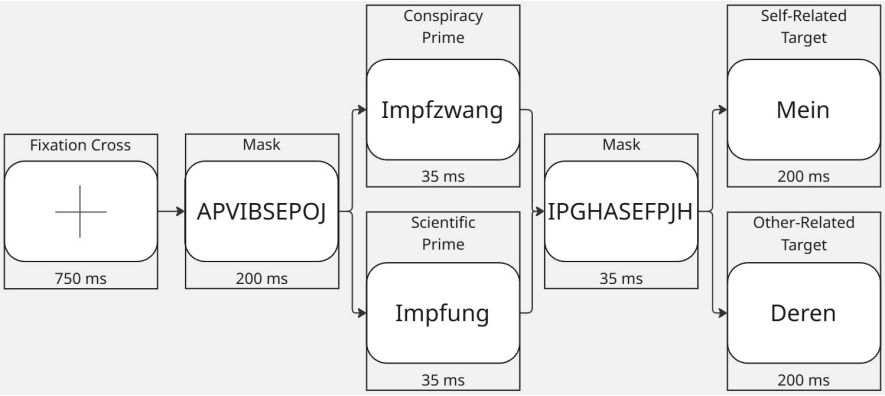


Figure 1. Depicted is an example of the sequence of displays (from left to right) in the masked-priming protocol. In unmasked conditions (not depicted), everything was the same, except that the masks were not presented.

The first, masked block consisted of 20 practice trials, followed by 320 experimental (data-collection) trials. The second, unmasked block had the same structure. In the unmasked block, trials were the same as in the masked block, but the forward and backward mask were left out (and empty screens displayed instead). In addition, for a subsample of all participants, we administered a control priming task block of 80 masked trials, as well as 80 unmasked trials, in which primes and targets were both drawn from the same lists of self-referential and other-referential words. The temporal structure of the trials was the same as for the experimental masked and unmasked priming blocks, and prime and target words were always different from one another. The control priming task was included to test if the priming protocol worked as intended. In line with prior research, we expected quicker reaction times in congruent conditions (self-referential prime and self-referential target/other-referential prime and other-referential target) than in incongruent conditions (self-referential prime and other-referential target/other-referential prime and self-referential target), at least in the masked conditions (and maybe also in the unmasked condition). Finally, with the same subsample of all participants, we conducted a prime-awareness or prime-visibility test. The awareness test consisted of 80 masked trials, as well as 80 unmasked trials, in which participants in each trial discriminated whether the prime was a science-related word or a conspiracy-related word. In this awareness-or visibility-task, we expected to confirm the effectiveness of the mask, meaning that participants were hypothesized to show more awareness of the prime under unmasked than masked conditions.

The keys "F" and "J" were used for the different two-alternative discrimination tasks, and the two possible stimulus-response mappings per task were counterbal-

anced across participants. Response identity and response time were recorded using experimental software OpenSesame version 3.3.14 (Mathôt et al., 2012). Participants completed the task in a quiet and controlled environment, with indirect light.

2.4. Questionnaires and Materials

2.4.1. Demographic Variables

For the demographic variables, we used two self-constructed items. For gender, the participants could answer "male", "female", and "prefer not to say". For age, we used age brackets (years: 0 - 18; 19 - 25; 26 - 30; 31 - 40; 40+). The first, somewhat coarse age bracket (0 - 18 years) included 18-year-old participants only.

2.4.2. Generic Conspiracist Beliefs Scale (GCB)

The Generic Conspiracist Beliefs Scale (GCB), developed by Brotherton et al. (2013), is a psychometric instrument designed to measure an individual's generalized tendency to endorse conspiracy theories. Unlike other conspiracy scales that are mostly targeting specific conspiracy theories, the GCB assesses beliefs in broad conspiratorial thinking, providing a general inclination towards conspiracist thinking across different subtypes of conspiracy theories. The GCB consists of 15 items that participants answer on five-point Likert scales, ranging from "definitely not true" to "definitely true." Items are organized into five dimensions: Government Malfeasance (e.g., the belief that governments cover up specific events in order to protect themselves and harm those who are not in power), Extraterrestrial Cover-Up (e.g., secret knowledge about alien life), Malevolent Global Conspiracies (e.g., control by hidden elites), Personal Wellbeing Conspiracies (e.g., pharmaceutical industry suppression of cures), and Control of Information (e.g., media manipulation). Every dimension consists of three items. The GCB demonstrates a high internal reliability (Cronbach's alpha = 0.93) and criterion-related, convergent, and discriminant validity were confirmed, along with strong test-retest reliability (Brotherton et al., 2013). For our specific sample, the calculated Cronbach's alpha was 0.916. Since the present study was conducted in German, the questionnaire was translated into German. The validity of the questionnaire was ensured through a back-and-forth translation.

To align the scores with the theoretical assumptions of agreement and disagreement, we re-coded responses to the items in a scale from −2 (strong disagreement) to +2 (strong agreement). We calculated a total score as the sum across all items, resulting in an overall conspiracy belief score from −30 to +30. These scores were then z-transformed for inferential analyses.

2.4.3. Masked Priming

In the masked-priming block/task, we investigated the influence of conspiracy theory-related and science-related primes on the processing of self-referential and other-referential targets. For primes related to conspiracy theories, words were extracted from multiple conspiracy-theory websites typically used for spreading

and communicating conspiracy thinking. A total of 93 words for each of the two categories was extracted, reflecting common topics and tropes associated with conspiracy beliefs (e.g., "Echsenmenschen," "Impfzwang," "Deep-State"). These words were selected based on an analysis of online discussion fora (e.g., "AUF1") known for disseminating conspiracy theories. Frequently occurring terms related to conspiratorial or scientific content were identified across multiple fora. Words that appeared multiple times in user postings were compiled into one topical category: "conspiratorial". The selected primes were equated to the scientific primes in their average word length and frequency. No formal pre-testing of the stimuli was conducted, but the topical assignment of the words was reviewed independently by two raters to ensure category validity.

The 93 science-related primes consisted of terms that are widely recognized as representing scientific concepts or aligning with the scientific consensus. They were selected from the same pool of topics that made up the conspiracy-related pool of words, but they were associated with scientific discourses (e.g., "Einwanderung", "Impfung", "Politik"). The aim was to create a pool of topically related words that clearly contrasted with respect to their associations with scientific versus conspiracy-related discourses. These measures of internal validity ensured that differential effects were due to different semantics/associations rather than to any confounding influences at the word level.

The targets were either self-referential or other-referential. Self-referential targets included words such as "mein", "mich", and "meiner", whereas other-referential targets included terms such as "deren", "andere", and "fremd." In the masked-priming task, the targets served to measure individual participants' implicit relations between the self and conspiracy-related theories and tropes (cf. Lukács & Ansorge, 2021). Across trials, primes and targets were orthogonally selected, such that equal amounts of word pairings resulted for 1) scientific primes presented prior to self-targets, 2) scientific primes presented prior to other-targets, 3) conspiracy-related primes presented prior to self-targets, and 4) conspiracy-related primes presented prior to other-targets. If participants truly believe in conspiracy theories, in the masked priming task/block, we expected a congruence effect based on a semantic congruence between conspiracy-related primes and self-targets that should facilitate responding relative to semantically incongruent pairings consisting of conspiracy primes and other-targets.

2.4.4. Unmasked Priming

In the unmasked priming task/block, the words and procedures were exactly the same as in the masked priming task/block, with the exception that the forward and backward masks were left out. Thus, primes were better visible under unmasked than masked conditions, meaning that participants could have strategically suppressed the unpredictive primes that did not predict the identities of the upcoming targets (cf. Ansorge et al., 2013; Kinoshita et al., 2011). That is, participants can notice that the primes do not help in the decision about the targets and are therefore suppressed. This type of suppression does not occur in the masked

priming conditions because the primes are not seen and, thus, their lack of predictivity is also not noticed.

2.4.5. Visibility/Awareness Test

In the visibility/awareness test, masked and unmasked conditions were presented intermixed, and participants had to discriminate if the primes belonged to the category of conspiracy-related words or to the category of scientific words. Here, we expected a higher performance under unmasked than under masked conditions.

2.4.6. Control Priming Task

In the control priming task, we used the same self- and other-referential words that were used as targets in the masked and unmasked blocks, but we used these self- and other-referential words both as targets and preceding primes. This was done to test whether, under masked conditions, a congruence effect can be found at least if the primes are taken from the same pool as the target words. Here, we expected a congruence effect under masked conditions, with facilitated responses under congruent conditions—with a self-prime presented prior to a self-target and with an other-prime presented prior to an other-target—compared to the incongruent condition—with a self-prime presented prior to an other-target and with an other-prime presented prior to a self-target. This expectation was based on the known ability of masked word primes to elicit responses and/or meaning representations corresponding to the responses required for the target words as well as to the meanings of the target words (e.g., Kiefer, 2002).

Only half of the participants, chosen at random, were tasked with the visibility/awareness test, as well as for the control priming task.

3. Results

3.1. Visibility Test

Mean accuracy was significantly lower in the masked condition (M = 0.45) than in the unmasked condition (M = 0.67), $t(39) = 10.39$, $p < 0.001$. To examine if participants' awareness of the unmasked primes was higher than that of the masked primes, Signal Detection Theory's sensitivity measure d' was calculated, separately for the masked and for the unmasked conditions, and subsequently compared for a significantly higher d' in unmasked than masked conditions. Sensitivity was significantly higher in the unmasked condition (M = 1.04) than in the masked condition (M = −0.38), $t(39) = 9.14$, $p < 0.001$. This finding confirms that the masking manipulation effectively reduced prime visibility and participants' awareness of the primes.

3.2. Control Priming Task

Although mean accuracy in the masked condition (M = 0.93) did not differ significantly from the unmasked condition (M = 0.91), $t(39) = 1.93$, $p = 0.061$, an obvious trend existed, showing higher accuracy rates in masked than unmasked

conditions of the priming control task.

Reaction-time data were analyzed after excluding incorrect responses, anticipatory responses faster than 50ms, due to the latency period of 200ms target presentation, and extreme responses slower than 2000ms. The same preprocessing criteria were applied to all inferential analyses. For the control priming task specifically, 68 trials were excluded because of errors and anticipatory responses (35 masked trials and 33 unmasked trials), leaving 6332 trials from 40 participants.

To ensure that primes could be processed even under masked conditions, reaction times were compared between congruent trials (prime and target both self-related or both other-related) and incongruent trials (prime and target mismatched). In the masked priming control-task condition, participants responded significantly faster on congruent trials (M = 271 ms) than on incongruent trials (M = 293 ms), $t(39) = 2.63$, $p = 0.012$. In contrast to some prior studies (e.g., Ansorge et al., 2013; Kinoshita et al., 2011), in the unmasked priming-control task condition, this congruence effect was stronger. Reaction times were faster on congruent trials (M = 381 ms) than on incongruent trials (M = 471 ms), $t(39) = 5.13$, $p < 0.001$.

These results of the priming control task demonstrate that primes influenced target processing in both masked and unmasked conditions, specifically in cases in which primes and targets were both either self-related or other-related. Thus, the currently used masked-priming task is in principle able to measure a congruence effect.

3.3. Masked and Unmasked Priming in the Implicit Measure of Conspiracy Beliefs

Mean accuracy was high in both masked (M = 0.946) and unmasked conditions (M = 0.940). A paired-samples t-test showed that this difference was towards higher accuracy rates in masked conditions, although not strong enough to be significant, $t(79) = 1.93$, $p = 0.057$. Participants' sensitivity (d') for the target(!) discrimination was significantly above chance (0) in both masked, $t(79) = 8.56$, $p < 0.001$, and unmasked conditions, $t(79) = 8.52$, $p < 0.001$. In addition, sensitivity of the target discrimination was higher in masked (d' = 3.26) compared to unmasked conditions (d' = 3.10), $t(79) = 2.64$, $p = 0.010$.

For the main priming task, 315 trials were excluded because of errors and anticipatory responses (198 masked trials and 117 unmasked trials), leaving 41200 trials from 80 participants.

A 2 (task/block: masked vs. unmasked) × 2 (prime type: scientific vs. conspiracy-related) × 2 (target type: self- vs. other-related) repeated-measures ANOVA was conducted on mean correct reaction times. Most importantly, interactions of theoretical interest failed to become significant, Prime Type × Target Type, $F(1, 79) = 0.17$, $p = 0.680$, Prime Type × Task/Block, $F(1, 79) = 0.05$, $p = 0.809$, and Task/Block × Prime Type × Target Type, $F(1, 79) = 1.59$, $p = 0.209$.

In addition, the ANOVA yielded a significant main effect of Task/Block, F(1,

79) = 42.44, $p < 0.001$, with faster responses in masked (M = 298 ms) than unmasked (M = 332 ms) conditions. There was also a significant main effect of target type, F(1, 79) = 7.52, $p = 0.006$, with faster responses to self-referring targets (M = 307 ms) than to other-referring targets (M = 312 ms). These main effects were qualified by a significant Task/Block × Target Type interaction, F(1, 79) = 21.89, $p < 0.001$, suggesting that the self-other difference was stronger under masked than unmasked conditions. Post-hoc tests clarified this interaction. In the masked condition, responses were significantly faster to self-related (M = 292 ms, SD = 85) than to other-related targets (M = 305 ms, SD = 93), t(79) = 3.61, $p < 0.001$. In the unmasked condition, however, the difference between self-related (M = 336 ms, SD = 101) and other-related targets (M = 328 ms, SD = 96) was not significant, t(79) = 0.53, $p = 0.59$. Furthermore, responses were faster under masked than unmasked conditions for both self-related, t(79) = 7.82, $p < 0.001$, and other-related targets, t(79) = 5.35, $p < 0.001$.

This is highlighted in Figure 2 below, where it can be seen that under masked conditions responses to self-related targets were faster than to other-related targets, but, under unmasked conditions, the effect of target type was numerically reversed, although not significantly so. Correspondingly, the benefit for unmasked compared to masked conditions was stronger for self-related targets than for other-related targets.

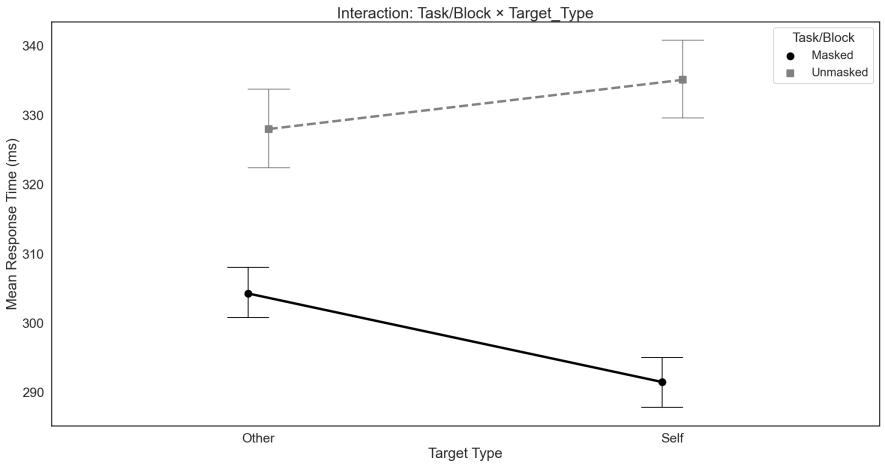


Figure 2. Mean response times (in ms) on the y axis as a function of target type (self-related vs. other related) on the x axis and of task/block, and error bars representing 95% CIs (masked: black, drawn line vs. unmasked: grey, broken line).

The main effect of Prime Type, F(1, 79) = 0.86, $p = 0.353$, and the Task/Block × Prime Type interaction, F(1, 79) = 0.06, $p = 0.809$, were both not significant.

3.4. Mixed-Effects Linear Regression

Participants' GCB scores had a mean of −11.81 (SD = 10.36), with scores ranging from −29 to 11, where scores closer to −30 correlate with a more non-conspiracy view, and scores closer to 30 correlate with a more conspiracy-related view. The

median GCB score was −13.50. Eleven of the 80 participants had positive endorsement scores (GCB > 0). For the median-split analysis, participants with GCB scores greater than or equal to the median (GCB ≥ −13.50) were classified as the Conspiracy group, whereas participants with scores below the median (GCB < −13.50) were classified as the Science group. This resulted in equal group sizes of 40 participants per group.

A mixed-effects linear regression was conducted with response time as the dependent variable, and prime type (conspiracy vs. scientific), target type (self vs. other), and belief group (conspiracy believers vs. science believers) as fixed effects. Random intercepts for participants were included to account for repeated measures. No significant interactions of theoretical interest emerged: Prime Type × Target Type (b = 4.68, 95% CI [−9, 18], z = 0.66, $p = 0.512$), Prime Type × Belief Group (b = 0.28, 95% CI [−13, 14], z = 0.04, $p = 0.969$), Target Type × Belief Group (b = −2.17, 95% CI [−16, 11], z = −0.30, $p = 0.761$), and the three-way interaction (b = −6.70, 95% CI [−26, 13], z = −0.66, $p = 0.506$). In addition, neither prime type (b = −2.81, 95% CI [−12, 7], z = −0.56, $p = 0.577$), nor target type (b = −6.48, 95% CI [−16, 3], z = −1.28, $p = 0.199$), nor belief group membership was a significant predictor (b = 23.12, 95% CI [−15, 61], z = 1.17, $p = 0.240$). Finally, the intercept indicated that average response time in the reference group (conspiracy believers, conspiracy prime, other target) was 279 ms, 95% CI [230, 329], z = 11.03, $p < 0.001$, and the random intercept variance across participants was 7168, indicating substantial between-participants variability in overall response times.

To test the primary prediction without dichotomizing GCB scores, a second linear mixed-effects model was fitted using the continuous GCB score as a predictor. The model included Prime Type, Target Type, and continuous GCB score, as well as all interactions, with a random intercept for participant. The predicted three-way interaction between GCB score, Prime Type, and Target Type was not significant (b = 0.31, 95% CI [−0.66, 1.27], z = 0.62, $p = 0.534$). Thus, the continuous GCB analysis likewise provided no evidence that the relationship between Prime Type and Target Type varied as a function of participants' level of conspiracy belief.

4. General Discussion

In the current study, we set out to test one of two broad views of the origin of an individual's conspiracy inclination. According to the view we tested in our study—the belief hypothesis—if a person explicitly advocates conspiracy theories, she or he actually believes in these theories (e.g., Imhoff & Bruder, 2014; Swami et al., 2014). According to versions of an alternative view—the communication hypothesis—however, the same person may simply be lying or strategically taking a partisan position with the in-group in the pursuit of her or his goals that are best served by these lies or strategic advocacy (e.g., to raise anger over a political enemy; e.g., Hebel-Sela et al., 2022; Jolley et al., 2022; Kahan, 2013). To discriminate between these two broad alternatives, we compared participants' explicit advocacy of conspiracy theories in an explicit measure—the GCB (Brotherton et al., 2013)—

and in an implicit priming measure. We reasoned that masked conspiracy-related prime words would facilitate self-target responses (more so than other-target responses) if a semantic association existed between belief-based attitudes towards conspiracy theories and self-target—that is, only among true believers in conspiracy theories. However, under the perspective of two versions of the communication hypothesis, we expected that the explicit GCB score and the implicit priming measure could be dissociated because either the participants that show an explicit conspiracy inclination in the GCB would actually hold the same true beliefs as everybody else or because the expression of a partisan viewpoint in an explicit measure would be based on conscious effort.

The congruence effect that was predicted under the perspective of the belief hypothesis was not found under masked and under unmasked priming conditions. Under unmasked priming conditions, this might have been due to the fact that participants could see the primes and, hence, suppressed processing of the primes because of the primes' unpredictive relationship between the primes and the following targets (cf. Kinoshita et al., 2011). However, the fact that the congruence effect was also missing in the masked priming task means that prime-directed suppression could not be the sole reason for the missing congruence effect. In fact, a visibility test made clear that the participants' seeing and awareness of the masked primes was indeed significantly lower than their seeing and awareness of the unmasked primes. Thus, the necessary preconditions for a contingency awareness (of the non-predictive relationship between prime and target) were simply not met under the masked priming conditions. In addition, our control version of the masked priming task showed that using the same types of masks and prime-target intervals as were used in our implicit conspiracy measure was theoretically sensitive for the registration of a congruence effect. Nevertheless, we were not able to find evidence to support the belief-based hypothesis.

5. Limitations

The present study has several limitations. First, we acknowledge that our suggested communication-based hypothesis falls short of explaining why some people act in accordance with their conspiracy belief, even if this means putting themselves in harm's way. For example, refusing vaccination, although they believe its beneficial, just to promote a conspiracy narrative (Jolley et al., 2022).

Second, our prime words might have been simply not optimal. Maybe our prime words did not cover the specific conspiracy theories that the participants of our study actually truly believed in. Related to this point, we used different primes relating to different types of conspiracy theories and, if a participant believed in one particular conspiracy theory, this would not mean that she or he believes in other conspiracy theories, too. Although participants inclined to report belief in conspiracy theories sometimes show huge diversity of accepting such theories, up to the astonishing acceptance of mutually exclusive conspiracy theories (e.g., at the same time agreeing that Lady Diana was killed and that she still lives; Wood

et al., 2012), an individual's unselective expressions of many (or maybe just any) conspiracy beliefs would definitely require an individual's knowledge of these different conspiracy theories, and this knowledge can simply not be taken for granted for all of our different conspiracy-priming tropes. Therefore, it is possible that a higher sensitivity of the implicit measure could be achieved in future studies with a more targeted and individualized pool of priming words that only concerned an individual participant's specific belief.

It is also possible to doubt the sensitivity of the masked-priming task for semantic prime-target relations altogether. For example, some authors have voiced skepticism regarding the possibility of measuring semantic congruence effects by means of masked primes altogether (e.g., Klinger et al., 2000; Kunde et al., 2003). We think that this reservation is less likely because of the many convincing arguments in favor of semantic processing of masked word primes that have been obtained in the meantime (e.g., Kiefer, 2002). For instance, masked prime words do elicit an N400 event-related brain potential that is known to reflect semantic processing, at least in trials in which word processing is ensured (e.g., Martens et al., 2011). With regard to the control priming task, we could have, and would recommend doing so in the future, used science- and conspiracy-related words as both targets and primes, to include a test confirming that participants are reliably able to differentiate between science- and conspiracy-related terms.

Finally, we might have simply sampled data from a population with a too low conspiracy inclination. In general, sufficiently extreme forms of the belief in and the explicit advocacy of conspiracy theories could be restricted to a relatively small margin of the general population. In line with this possibility, our sample showed an on average small tendency toward conspiracy beliefs in the GCB. Future studies could, thus, repeat a study with a similar protocol as the current one, but address subpopulations that are suspected to hold more extreme views to begin with.

6. Conclusion

When democratic societies want to defend their institutions and constitutions against the undermining influences of falsehoods, fake news, and conspiracy theories, they need to find effective means to intervene with the spread of and belief in conspiracy theories at an individual level (Voelkel et al., 2024). The current study was not able to confirm a belief-based hypothesis, and therefore indirectly supports, but cannot confirm, the view of the partisan cheerleading theory that humans could spread conspiracy theories on purpose, for example, for the pursuit of their individual goals and, thus, deliberately lie. This would imply that interventions targeted at altering individuals' beliefs could be less effective than interventions aimed at providing novel means for the negotiation of these individual goals.

Author Contributions

Conceptualization, Daniel Gugerell, and Sophie Steiner; methodology, Daniel Gugerell, Sophie Steiner, and Ulrich Ansorge.; software, Daniel Gugerell.; valida-

tion, Daniel Gugerell, Sophie Steiner, and Ulrich Ansorge; formal analysis, Daniel Gugerell, and Sophie Steiner; investigation, Daniel Gugerell and Sophie Steiner; resources, Daniel Gugerell, Sophie Steiner, and Ulrich Ansorge; data curation, Daniel Gugerell, and Sophie Steiner; writing—original draft preparation, Daniel Gugerell, and Sophie Steiner; writing—review and editing, Daniel Gugerell, and Ulrich Ansorge; visualization, Daniel Gugerell; supervision, Ulrich Ansorge; project administration, Ulrich Ansorge; funding acquisition, Ulrich Ansorge. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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