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Overconfidently conspiratorial: Conspiracy believers are dispositionally overconfident and massively overestimate how much others agree with them

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Abstract

There is a pressing need to understand why people believe in conspiracies. Although past work has focused on needs and motivations, we propose an alternative driver of belief: overconfidence. Across eight studies with 4,181 U.S. adults, conspiracy believers consistently overestimated their performance on numeracy and perception tests (even after taking their actual performance into account). This relationship with overconfidence was robust to controlling for analytic thinking, need for uniqueness, and narcissism, and was strongest for the most fringe conspiracies. We also found that conspiracy believers – particularly overconfident ones – massively overestimated (>4x) how much others agree with them: Although conspiratorial claims were believed by a majority of participants only 12% of the time, believers thought themselves to be in the majority 93% of the time. This was evident even when asked to rate

agreement among counter-partisans, indicating that conspiracists are genuinely unaware that their beliefs are on the fringe.

The causes and consequences of beliefs in conspiracy theories[1] have drawn considerable attention among psychologists in recent years (Douglas & Sutton, 2023; Hornsey et al., 2022; Uscinski et al., 2022) – and for good reason. Conspiracies about the COVID-19 pandemic have become mainstream (Lazarević et al., 2021), as have conspiracies about other major events, such as the 2020 U.S. Presidential Election (Pennycook & Rand, 2021). A salient (albeit anecdotal) characteristic of people who believe conspiracy (hereafter "conspiracy believers") is that they often appear to have genuine and confident beliefs in claims that, at least in terms of expert or "official" consideration, are quite implausible. How does this happen?

One perspective on conspiracy beliefs is that they are a type of active – and perhaps even reasonable – response to one's environment. That is, they emerge out of a variety of motives (Douglas & Sutton, 2023; Sternisko et al., 2020), such as the motive to be original or unique (Imhoff & Lamberty, 2017; Lantian et al., 2017), or because they satisfy social identities and help achieve collective action (Cichocka et al., 2016). People have even likened conspiracies to a form of creative expression, such that conspiracies are viewed as being elaborate and intricately designed (Zuckerman, 2019). In fact, believers often reject the label "conspiracy theorist", and prefer to see themselves as "critical freethinkers" to positively distinguish themselves from "the sheeple" who reject conspiracies (van Prooijen, 2019). This account centers the social and cultural factors that impact belief in conspiracies (Bowes et al., 2023; Douglas & Sutton, 2023; Jetten et al., 2022; Robertson et al., 2022; van Prooijen, 2022; Wagner-Egger et al., 2022).

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[1] A conspiracy is defined as a case where "two or more actors have coordinated in secret to achieve an outcome, and that their actions are of public interest but not widely known by the public" (Douglas & Sutton, 2023). Although conspiracy "theories" are often defined as being implausible or false (Douglas & Sutton, 2023), we will use the term "conspiracy believer" to simply label people who believe in the existence of a conspiracy (either true or false).

An alternative perspective is that conspiracy beliefs reflect a form of reasoning error – not as a normative claim (in fact, some conspiracies are true), but in terms of how they are typically developed and maintained (Pennycook, 2023). That is, relative to non-believers, conspiracy believers are thought to be overly influenced by misinformation and hold such beliefs because they have difficulty distinguishing fact from fiction. Consistent with this account, people who believe false conspiracies tend to lack analytic thinking skills (Bayrak et al., 2025; Binnendyk & Pennycook, 2022; Swami et al., 2014) and people may come to conspiracies through intuitive biases such as hypersensitive agency detection (Douglas et al., 2016) or illusory pattern perception (van Prooijen et al., 2018). Furthermore, when conspiracy believers are presented with personalized counterevidence from Artificial Intelligence, many (albeit not all) change their minds (Costello et al., 2024, 2025). This perspective focuses more on the underlying cognitive factors that impact how people judge what is true (Brashier & Marsh, 2020) and implies that conspiracy belief is supported by the tendency to adopt intuitive beliefs and to not question them using analytic thinking (Pennycook, 2023).

Here aim to complement these conflicting (albeit not necessarily mutually exclusive) perspectives by investigating a factor that may block conspiracy believers from questioning their beliefs: *overconfidence*. Specifically, we posit that false conspiracy belief is fostered and protected by a general tendency to overrate one's cognitive abilities – that is, a *disposition* towards overconfidence. This is different from having a need for uniqueness (Imhoff & Lamberty, 2017) or from being narcissistic (Cichocka et al., 2022), which relate to one's desire or motivation to be *seen* positively. Instead, our account assumes a difference in the way that people process information: We propose that dispositional overconfidence blocks conspiracy believers from adequately questioning their beliefs and perhaps even realizing that their beliefs

are on the fringe. This implies that underlying cognitive factors impact both conspiracy beliefs themselves and social judgments relating to the beliefs.

This perspective is indirectly supported by past work finding that people who reject scientific consensus think that they know the most about science (despite actually knowing the least) (Light et al., 2022) and that conspiracy belief is correlated with stronger "illusion of explanatory depth" (i.e., inflated confidence in their understanding of the causal processes related to political policies) (Vitriol & Marsh, 2018). Relatedly, research on misinformation has found that a miscalibration between what one thinks they know and the actual knowledge they possess is an important factor in determining misperceptions (Rapp & Withall, 2024; Salovich et al., 2022).

More directly, some research has correlated conspiracy belief with overconfidence (Teovanović et al., 2021; Vranic et al., 2022); however, this work uses measures where conspiracy belief is associated with performance on the relevant task. Thus, it is unclear if the association is due to genuine overconfidence (as a trait), or simply weaker performance on that task (Binnendyk & Pennycook, 2024). Relatedly, Sanchez and Dunning (2021) found that the tendency to "jump to conclusions" in probabilistic reasoning tasks is associated with both conspiracy beliefs (see also Pytlik et al., 2020) and overconfidence. However, overconfidence was also measured in relation to a knowledge quiz and hence was confounded by task performance (Spiller, 2024). Interestingly, however, Sanchez and Dunning (2021) found that jumping to conclusions was associated with higher confidence despite diminishing performance over time, thus indicating that the tendency to rapidly form and hold hypotheses (which is associated with conspiracy belief) does relate to a genuine miscalibration. Nonetheless, this evidence is indirect as it relates to overconfidence and conspiracy beliefs *per se*.

Measuring the disposition to be overconfident

To investigate the potential relationship between overconfidence and conspiracy belief, we leverage a new measurement approach that allows for a more robust way to assess dispositional overconfidence. Specifically, overconfidence is often assessed by giving participants a specific test (e.g., a test of numerical ability) and asking them to indicate their confidence in some way (e.g., by estimating how many problems they answered correctly). Overconfidence is then defined as the difference between one's estimated performance and their actual performance (or between their confidence and accuracy, or etc.; hereafter, this will be referred to as 'Overconfidence 1'; see Moore & Dev, 2018). As outlined in more detail by Binnendyk and Pennycook (2024), this approach is limited by the fact that there is often a correlation between one's perceived performance and their actual performance; and, hence, overconfidence is influenced not just by one's tendency to say that they are uniquely good at tasks, but by their actual performance on the task (Clifton & Clifton, 2019; Tennant et al., 2022). Put differently, a person who is genuinely good at a task will not have the appearance of overconfident, but if they were given a task that they are not good at they might appear overconfident.

In the current work, we address this concern in two ways. First, we will attempt to address the issue statistically. In particular, we use estimated performance to predict conspiracy beliefs while controlling for actual accuracy in a regression analysis (referred to below as "Overconfidence 2"). This more effectively takes into account variance explained by performance on the task and is related to past work focused on metacognitive calibration (Bol & Hacker, 2012; Keren, 1991). However, as outlined in this past work, the statistical approach is inherently limited by the quality of the underlying measurement – i.e., when calculating

overconfidence using both estimated and actual performance, variability in performance will lead to variability in overconfidence. This undermines the use of overconfidence as a measure of an underlying trait that is disconnected from whatever idiosyncratic task is being used. As such, to assess one's disposition to be overconfident more directly, participants will also be given a task where their actual performance and their perceived importance are unrelated to each other (Binnendyk et al., 2024; Binnendyk & Pennycook, 2024). Using this different approach to measuring overconfidence has been shown to be reliable over time (i.e., to have good test-retest reliability; Binnendyk & Pennycook, 2024), strong predictive validity (Binnendyk & Pennycook, 2024), and to be consistent across a wide range of tasks (so long as it is measured with tasks where performance and confidence are unrelated and therefore unconfounded; Binnendyk et al., 2024). This therefore allows us to more directly measure whether one's willingness to overrate their own abilities is related to their belief in conspiracies.

We present consistent evidence across eight studies that dispositional overconfidence – measured here by overestimating one's performance (i.e., "overestimation"; Moore & Healy, 2008) on cognitive tests – is a robust and unique predictor of conspiracy beliefs. Furthermore, we find that people who believe in false conspiracies massively overestimate how much others agree with them, and that overconfidence (but not analytic thinking, narcissism, or need for uniqueness) predicts this false consensus effect (Ross et al., 1977). This indicates that false conspiracy belief may not be as influenced by needs and motivations as it is by a simple lack of awareness that one believes something that is contradicted by established evidence and is therefore on the fringe.

Studies 1-4

We first investigated the potential dual roles of intuitive thinking and overconfidence in supporting conspiracy beliefs. All four studies use the difference between estimated and actual performance to assess overconfidence, such that those who overestimate their performance are considered overconfident (i.e., the "Dunning-Kruger Effect"; Dunning, 2011; Kruger & Dunning, 1999). Importantly, in Studies 2-4 we use the "Generalized Overconfidence Task" (GOT; Binnendyk & Pennycook, 2024). For this, a fuzzy image with a very difficult to discern target (i.e., an adversarial image; c/o Zhou & Firestone, 2019) is momentarily flashed on screen followed by a binary choice asking the participant what was depicted in the image (e.g., a chimpanzee or a baseball player – see Figure 1). This was repeated with six unique images. The task is extremely difficult and essentially requires participants to simply guess. Thus, participants have little reason to believe that they did well – allowing higher estimated performance to more directly index higher levels of trait overconfidence without being confounded by actual performance (Binnendyk & Pennycook, 2024).

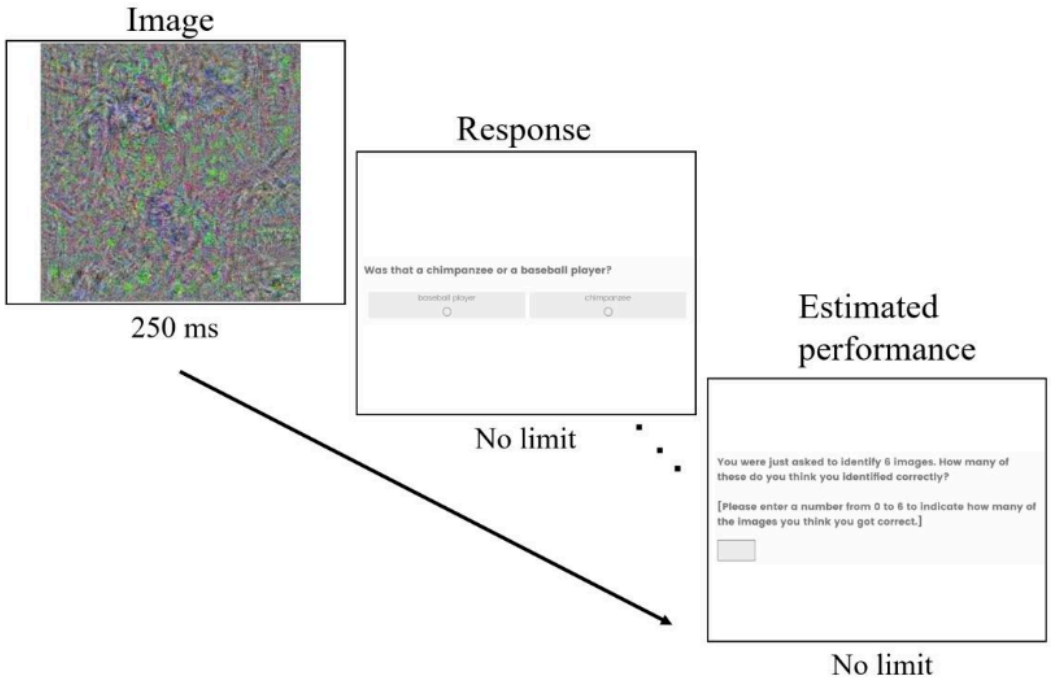

Figure 1. *Perception test procedure. Participants were shown 6 images. Image order was randomized and estimated performance came after all 6 images/responses.*

The GOT task has been shown to have strong convergent and divergent validity (Binnendyk & Pennycook, 2024) – i.e., it predicts a wide range of relevant outcomes (e.g., bullshit receptivity, overclaiming, thinking styles, etc.), but is not strongly related to measures that suggests alternative explanations of why people report doing well on the task (e.g., wishful thinking, optimism, self-efficacy, etc.). The task also has test-retest reliability that is on-par with other behavioral measures of dispositions, such as risk preferences (Binnendyk & Pennycook, 2024). Furthermore, a recent adversarial collaboration between researchers who do and do not view overconfidence as a stable trait found strong support for trait overconfidence using this sort of assessment (including the GOT in particular; see Binnendyk et al., 2024).

In Studies 1-4, we assessed overconfidence with two additional tasks (beyond the perception test, as mentioned above). First, to obtain an estimate of one's propensity to engage in analytic thinking, we gave participants a modified version of the Cognitive Reflection Test (CRT; Frederick, 2005) that contains both re-worded versions of the original problems (via Shenhav et al., 2012) and non-numeric items (Thomson & Oppenheimer, 2016). The problems contain an incorrect intuitive lure that typically requires deliberation to override (Frederick, 2005; Pennycook et al., 2016; Toplak et al., 2011). Consider the following item: "If you're running a race and you pass the person in second place, what place are you in?" (via Thomson & Oppenheimer, 2016) Although many participants intuitively answer "first place", the correct answer is that you are now in second place (having overtaken their position). Although we had participants estimate their performance on this task, overconfidence tends to be artificially high because the intuitive lure essentially tricks participants into believing that they have the correct answer when they are actually incorrect (see Mata et al., 2013; Pennycook et al., 2017). The

implication of this is that people who are not otherwise overconfident will appear overconfident on the CRT (and particularly so if they do poorly on the test).

We also administered a numeracy and risk literacy test (Cokely et al., 2012; Lipkus et al., 2001). This was included because it is a cognitive ability task that is similar to the Cognitive Reflection Test, but that does not include intuitive lures. Thus, estimated performance on the task should predict conspiracy beliefs once actual performance is taken into account.

Method

Data, materials, and preregistrations for all studies are available on OSF. All non-preregistered analyses are labeled as post hoc or is noted directly in some way. Furthermore, in every study, we preregistered a sample size that was larger than probably necessary (e.g., correlations with effect sizes typical for social psychology tend to stabilize at a sample of ~250; Schönbrodt & Perugini, 2013). The criteria we used to determine the sample size in Study 1 was to oversample so that we would have more than 250 (and hence we set of target of 300). In Studies 2-4, we increased this target to 500 with the goal of providing precise estimates of our effect sizes.

Participants

Sample characteristics for Studies 1-4 can be found in Table 1. Missing values for the behavioral tasks were considered incorrect and thus the few participants who skipped a handful of individual questions were not removed. In all studies, participants were compensated commensurate with the standards of the recruiting platform. For MTurk, participants were compensated to roughly the U.S. minimum wage ($7.25 per hour, ~12 cents per minute). For Prolific, participants were given pay commensurate with the platform's recommendation of £9 per hour (~15 pence per minute). For Lucid, participants get a variety of incentives (e.g., cash,

gift cards, loyalty reward points) that are determined by different suppliers and so individual compensation for participants is not known. In all studies, participants were recruited from U.S. samples. Our final samples provided sufficient statistical power (80%) to detect effects as small as *r*'s = .09 (Study 4) to .11 (Study 1).

Table 1. *Sample characteristics for Studies 1-4. DNF = Did not finish (including participants who opened the survey and quit immediately). Participants were removed for skipping or giving nonsense answers to the estimated performance questions. Those who failed a trivial attention check at the beginning of the study were either removed manually or not permitted to complete the study. N for female and male do not equal final N because some individuals indicated something other than male/female or did not answer the question.*

Study	Source	Initial N	DNF	Removed	Final N	$\bar{x}_{age}$	N Female	N Male
1	MTurk	347	46	6	295	34	105	189
2	MTurk	549	45	7	497	36	251	243
3	Lucid	682	198	8	476	45	257	217
4	Prolific	587	78	8	501	35	251	241

Materials

In all cases, total scores for each scale were computed by taking the mean across items.

Belief in Conspiracy Theory Inventory (BCTI). Following best practice recommendations (Swami et al., 2017), we measured conspiracy beliefs by asking direct questions about popular conspiracy claims (e.g., "The Apollo moon landings never happened and were staged in a Hollywood film studio" – See Appendix A for the full list of items; we used a scale from 1-Completely false to 9-Completely true). Other ways of measuring conspiratorial ideation, such as using a generic conspiracy belief scale or a conspiracy mentality questionnaire have been shown to have less reliable factor structures and weaker convergent validity (Swami et al., 2017). We used the 15-item BCTI, which had excellent scale reliability in every study, Cronbach's $\alpha \geq .95$.

In Study 3, we augmented the BCTI with 13 new items that represent more contemporary conspiracy theories. There was a strong correlation between belief in the original 15 items and the new 13 items, $r = .81$, so we combined them into a single measure (following our preregistration). The combined scale had very strong reliability, Cronbach's $\alpha = .95$.

In Study 4, we added 22 items to the list of 28 from Study 3. We also included a set of 16 true conspiracies (e.g., that the FBI was spying on John Lennon). Each participant was presented with 33 items, which were randomly selected from the full set. As such, the proportion of true versus false conspiracies varied across participants. Although there was a positive correlation between belief in true and false (or, to be more precise, verified and unverified) conspiracies, $r = .32$, it was not particularly strong (particularly relative to the correlation among false conspiracies) and thus we consider true versus false conspiracies separately. A full list of the items used across all four studies can be found in the Appendix A.

Cognitive Reflection Test (CRT). We administered a 7-item Cognitive Reflection Test that included reworded versions (Shenhav et al., 2012) of the original 3-item CRT (Frederick, 2005) and the 4-item non-numeric CRT problems (Thomson & Oppenheimer, 2016). For example, "If you're running a race and you pass the person in second place, what place are you in?" CRT questions are designed to elicit intuitive answers that are incorrect (in the previous example, people frequently answer first place when the correct answer is, in fact, second place). The measure is argued to measure one's willingness or ability to engage analytic thinking (Frederick, 2005). In Study 2 and on, we removed the 'Emily' question (the only question from Study 1 that included a non-numeric response). This was done so that it would have the same number of items as the generalized overconfidence task. After completing each set of items,

participants were asked to estimate how many they thought they answered correctly[2]. Participants overestimated their performance in every study (Study 1: M_{actual} = 3.7, $M_{estimate}$ = 5.6; Study 2: M_{actual} = 2.7, $M_{estimate}$ = 4.8; Study 3: M_{actual} = 1.3, $M_{estimate}$ = 4; Study 4: M_{actual} = 2.6, $M_{estimate}$ = 4.8, all p's < .001).

Numeracy test. We administered a 7-item numeracy and risk literacy test that included four items from the Berlin Numeracy Test (Cokely et al., 2012) and three items from the Lipkus numeracy task (Lipkus et al., 2001). The tests measure basic probabilistic and mathematical competency and includes items like "Imagine that we roll a fair, six-sided die 1000 times. Out of 1000 rolls, how many times do you think the die would come up as an even number?". We removed the "Forest" question after Study 1 following the logic noted above. After answering all items, participants were asked to estimate their performance (as described above). Participants overestimated their performance in every study (Study 1: M_{actual} = 3, $M_{estimate}$ = 4.5; Study 2: M_{actual} = 2.9, $M_{estimate}$ = 4.2; Study 3: M_{actual} = 1.6, $M_{estimate}$ = 2.6; Study 4: M_{actual} = 3.5, $M_{estimate}$ = 3.6, all p's < .015). although interestingly, this overestimation was smaller than for the CRT in every study, all F's > 10, p's < .002. Specifically, the average estimate was 2.05x larger than the average actual score across the four studies for the CRT, whereas for the numeracy test, the average estimate was only 1.40x larger than the average actual score (despite overall performance being quite similar for the two tasks; Mean = 2.6 for CRT, Mean = 2.8 for numeracy). This is consistent with the argument that overconfidence is inflated on the CRT because it includes intuitive lures (i.e., it is specifically designed to trick people into thinking that

[2] Due to an error, participants in Study 2 were asked to rate their performance for the behavioral tests as if there were 7 items when only 6 were presented. We changed all estimates of '7' to '6'. This wording error was fixed in Studies 3 and 4. It did not appear to influence our results.

they are doing well when they are doing poorly and hence has been associated with a uniquely large Dunning-Kruger effect; Mata et al., 2013; Pennycook et al., 2017).

Perception test. Participants were also given a novel task to assess overconfidence in Studies 2-4. For this, participants were rapidly presented with an adversarial image (as in Figure 1) and asked to indicate which of two potential objects was present. This was done with 6 images. Participants were then asked to estimate how many they identified correctly. Consistent with past work (Zhou & Firestone, 2019), participants were only barely above chance in terms of their ability to discern the objects ($M_{Study\ 2}$ = 54%; $M_{Study\ 3}$ = 54%; $M_{Study\ 4}$ = 59%; p's < .001)[3]. More importantly, actual performance was not consistently positively associated with estimated performance – and, in fact, was negatively associated in one study (r_{Study2} = -.09, p = .049; r_{Study3} = .15, p = .001; r_{Study4} = .02, p = .685). Thus, as expected, confidence was not strongly calibrated to the task and therefore may be more reflective of generalized overconfidence. Images used in the perception test can be found in Appendix B.

Additional measures. We also included additional measures that are beyond the scope of the present investigation. This varies across study and can be found in the supplementary materials. Participants were also asked a set of demographic questions, including age, gender, education, income, ethnicity, belief in God, and a set of political ideology/partisanship questions.

Procedure

Participants first completed the behavioral tasks. The perception test always came first (except Study 1, where it was not included) and the order of the CRT and numeracy tests were always counterbalanced. The conspiracy belief inventory came after. Participants completed demographic questions and an attention check at the end of the study session.

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[3] Accuracy rates were computed by excluding missing values. If missing values are included as errors, participants were below chance.

Results

Table 2 outlines the key findings. In all four studies, belief in conspiracy theories was always significantly negatively correlated with performance on the Cognitive Reflection Test and numeracy (r's range from -.19 to -.55) – consistent with prior work indicating an association between intuitive thinking and belief in conspiracies (Binnendyk & Pennycook, 2022). As expected, performance on the perception test (in which participants are largely guessing) does not correlate with conspiracy belief in any of the studies (r's < .05). Furthermore, simple overconfidence (i.e., the difference between estimated and actual performance; "Overconfidence 1") is positively correlated with conspiracy belief for all three tasks (r's range from .14 to .51). More importantly, for numeracy and the perception test (but not for the CRT, except in one study), estimated performance was positively associated with conspiracy belief after actual performance was taken into account in a regression analysis ("Overconfidence 2"). This provides a stronger test, since it removes performance-related confounds. Thus, with respect to the numeracy and perception tests, Studies 1-4 provide consistent evidence for an association between conspiracy belief and dispositional overconfidence (see the Discussion for more on why overestimated performance on the CRT may not reliably measure dispositional overconfidence). In contrast, belief in true conspiracies was nominally (but not significantly) *positively* associated with accuracy on the CRT, $r = .08$, $p = .063$, and numeracy test, $r = .08$, $p = .081$. There was no association between overconfidence on any task and belief in true conspiracies (and, in fact, they were nominally in the opposite direction, r's < -.06, p's > .223).

Table 2. *Correlations (Pearson's r) between false conspiracy beliefs (BCTI) and actual accuracy, estimated accuracy, and overconfidence on the three tasks in Studies 1-4. CRT = Cognitive Reflection Test. Overconfidence 1 = Estimated minus Actual accuracy. Overconfidence 2 =* $r_{partial}$ *correlation between estimated accuracy and BCTI after controlling for actual accuracy.*

Task	Measure	Study 1	Study 2	Study 3	Study 4
CRT	Actual Accuracy	-.55***	-.47***	-.27***	-.19***
	Estimated Accuracy	-.26***	-.07	-.06	< .01
	Overconfidence 1	.41***	.38***	.14**	.18***
	Overconfidence 2	-.02	.09*	.01	.07
Numeracy	Actual Accuracy	-.53***	-.36***	-.40***	-.23***
	Estimated Accuracy	-.05	-.04	-.08	-.04
	Overconfidence 1	.51***	.31***	.25***	.21***
	Overconfidence 2	.25***	.15**	.11*	.12**
Perception	Actual Accuracy	-	-.04	.03	-.01
	Estimated Accuracy	-	.21***	.28***	.17***
	Overconfidence 1	-	.19***	.25***	.14**
	Overconfidence 2	-	.21***	.30***	.17***

***$p \leq .001$, **$p \leq .01$, *$p \leq .05$

To get a sense of the effect size in terms of actual conspiracy endorsement, we recoded conspiracy beliefs from the continuous scale to a binary "true" versus "not true" scale ("unsure" was included in the latter). This therefore represent the proportion of participants who indicate thinking that each conspiracy is true (v. not true). Using this score, participants below the median on overconfidence (combining the individual Overconfidence 1 measures for simplicity) did not indicate believing most of the conspiracies: Study 1 = 26%; Study 2 = 29%; Study 3 = 39%, Study 4 = 19% (these numbers represent the % of conspiracies rated as "true"). However, participants above the median in overconfidence had a notably higher level of conspiracy endorsement: Study 1 = 66%; Study 2 = 54%; Study 3 = 53%, Study 4 = 28% (note that Study 4 included a much larger list of conspiracies).

Our results indicate that overconfidence predicts conspiracy beliefs even after taking cognitive sophistication into account. Specifically, estimated performance on the numeracy test predicts conspiracy beliefs after taking actual performance on the numeracy test into account (Table 2). Furthermore, performance on the perception test is essentially random (and, suitably,

not correlated with CRT or numeracy performance in any study, r's < .08, p's > .05) and, yet, estimated performance on the test consistently predicted conspiracy beliefs. As an additional (post hoc) test of this, we included CRT and numeracy scores (our "cognitive sophistication" measures) in a regression analysis alongside estimated accuracy on the perception test to predict conspiracy beliefs. In all three relevant studies, estimated performance continued to predict conspiracy beliefs after controlling for cognitive sophistication: $\beta_{\text{Study 2}} = .15$; $\beta_{\text{Study 3}} = .24$; $\beta_{\text{Study 3}} = .17$, all p's < .001. This indicates a unique role for overconfidence.

Study 4 also included a much larger list of conspiracies with the goal of investigating whether overconfidence has a stronger association with belief for conspiracies that are more on the fringe. Consistent with our prediction, there was a very strong correlation (at the item-level) between the believability of the conspiracy claim (i.e., the mean truth rating for the item) and how strongly positive the correlation was with overconfidence (i.e., the correlation between belief in the conspiracy and the mean level of overconfidence across our three overconfidence measures[4]); see Figure 2. Specifically, overconfidence is increasingly positively predictive of belief for conspiracies that are the least plausible, $r(64) = -.86$, $p < .001$. Interestingly, both cognitive reflection, $r(64) = .70$, $p < .001$, and numeracy, $r(64) = .74$, $p < .001$, are also more strongly predictive of (dis)belief in conspiracies that are the least plausible (for a related finding in the context of misinformation, see Pennycook & Rand, 2019).

[4] This deviates from our preregistration, which mistakenly said that we would aggregate "estimates" instead of overconfidence. Note also that reliability for the three overconfidence measures was modest: Cronbach's α = .6 in Studies 2 and 3 and .5 for Study 4. Nonetheless, the results of the item analysis are similar when using individual overconfidence measures.

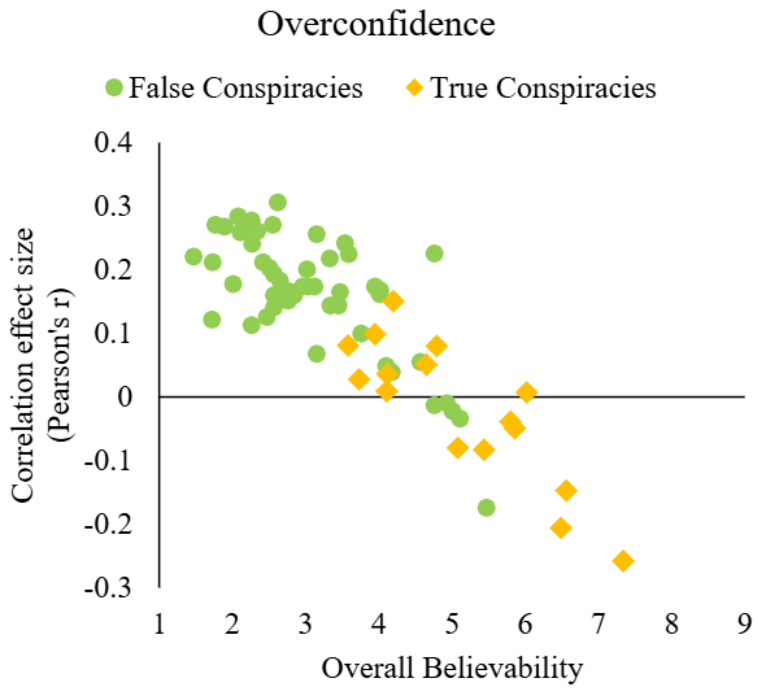

Figure 2. *Scatterplots displaying, for each item, the correlation between overall believability (i.e., mean truth rating; y-axis) and the correlation effect size (Pearson's r) between belief and overconfidence (i.e., mean of the three "Overconfidence 1" measures). False and unlikely (unverified) conspiracies are represented with green circles, and true (verified) conspiracies are represented with yellow diamonds. Overconfidence becomes increasingly positively predictive of belief for conspiracies that are the least believable,* $r(64) = -.86$, $p < .001$. *Data from Study 4.*

Studies 5-7

In Studies 1-4, we measured overconfidence in three distinct tasks and, for two out of the three tasks, found a consistent connection between overconfidence and belief in conspiracy theories. Importantly, conspiracy believers consistently gave higher estimates of their performance even after taking into account their actual performance (i.e., "Overconfidence 2") for the numeracy and perception tests, thus indicating an association with overconfidence that is not explained by task performance. Furthermore, this correlation may be influenced by the underlying plausibility of the conspiracy theory. In particular, we found that conspiracy beliefs

that were more on the fringe (in terms of believability) were more strongly associated with overconfidence.

These findings indicate that a disposition to overrate one's cognitive skills may play an important role in conspiracy beliefs. This stands in contrast to perspectives that characterize conspiracy beliefs as a type of active response to the environment that fulfills various needs and motives. For example, research has found that grandiose narcissism and a need for uniqueness may play a role in conspiracy beliefs (Imhoff & Lamberty, 2017; Lantian et al., 2017). This perspective implies that people believe conspiracies because, to put it simply, they *want* to. In contrast, our focus on overconfidence implies a more passive account where people adopt conspiracy beliefs without even really considering whether they might be wrong.

To test these competing ideas, we moved beyond people's beliefs in conspiracies to their understanding of where they stand relative to others. In particular, most people do not believe in (most) false conspiracies (see Figure 2). If overconfidence is an important component of conspiracy beliefs, then it is likely that believers do not realize that they are in the minority. In contrast, if conspiracy beliefs are more driven by the need for uniqueness, then believers may well know that they are in the minority – in fact, they may revel in this fact.

To test these accounts, we asked participants to indicate if a set of conspiratorial claims were true or false and then to estimate the percentage of people who agree with them. We then created an *overestimated agreement* measure by taking the difference between people's estimated agreement and the actual level of agreement in the sample. Our confidence-based account predicts that that conspiracy believers will overestimate how much others agree with them and that this, along with conspiracy belief itself, will be predicted by overconfidence.

Method

Participants

Sample characteristics can be found in Table 3. Regarding sample size justification, we began with a target sample size of ~250 (with some oversampling), as in Study 1. However, the results for Study 5 were not as robust as expected, and we therefore doubled the target sample for Studies 6 and 7 to be ~600 participants. Our final samples provided sufficient statistical power (80%) to detect effects as small as *r*'s = .08 (Study 7) to .11 (Study 5).

Table 3. *Sample characteristics for Studies 5-7. DNF = Did not finish (including participants who opened the survey and quit immediately). Participants were removed for giving too high of estimates or skipping the estimate question. Those who failed a trivial attention check at the beginning of the study were either removed manually or not permitted to complete the study. N for female and male do not equal final N because some individuals indicated something other than male/female or did not answer the question.*

Study	Source	Initial N	DNF	Removed	Final N	$\bar{x}_{age}$	N Female	N Male
5	Prolific	327	23	2	302	36	197	99
6	Lucid	859	207	61	591	46	309	281
7	MTurk	683	81	10	592	39	250	339

Materials

Belief in Conspiracy Theory Inventory (BCTI). Participants were shown 25 false and 8 true conspiracies (in a random order) and asked to rate whether they believe them to be true or false (with no other option). We used 50 false and 16 true conspiracies (see Appendix A) and participants were given one of two counterbalanced sets, which were matched on overall believability based on previous studies. After indicating whether they believed the conspiracy to be true or false, we (on the same page) asked them to estimate other's agreement: "What percentage of people do you think agree with you?". They responded on a sliding scale from 0 to 100, with labels that read "most disagree with me", "half agree, half disagree", and "most agree with me" on the left, middle, and right of the scale, respectively.

Cognitive Reflection Test (CRT). The same items were administered as in Studies 2-4. Participants overestimated their performance in every study (Study 5: M_{actual} = 3.2, $M_{estimate}$ = 4.6; Study 6: M_{actual} = 1.3, $M_{estimate}$ = 4.2; Study 7: M_{actual} = 3.7, $M_{estimate}$ = 4.9; all p's < .001).

Numeracy test. The same items were administered as in Studies 2-4. Surprisingly, participants did not, on average, overestimate their performance in Study 5: M_{actual} = 3.4, $M_{estimate}$ = 3.3, $t(301) = 1.43$, $p = .153$. This may explain why the results for numeracy overconfidence in Study 5 did not match those of all other studies. Participants overestimated their performance on the numeracy task in the other two studies, as expected (Study 6: M_{actual} = 1.3, $M_{estimate}$ = 2.8; Study 7: M_{actual} = 3.5, $M_{estimate}$ = 3.8, both p's < .001).

Perception test. The same items were administered as in Studies 2-4. Actual performance was not associated with estimated performance in any of the studies ($r_{Study5} = .03$, $p = .656$; $r_{Study6} = -.07$, $p = .088$; $r_{Study7} = -.04$, $p = .306$).

Additional measures. We also included additional measures that are beyond the scope of the present investigation. This varies across study and can be found in the supplementary materials. Participants were also asked a set of demographic questions, including age, gender, education, income, ethnicity, belief in God, and a set of political ideology/partisanship questions.

Procedure

Participants first completed the behavioral tasks (perception, CRT, and numeracy). The perception test always came first and the order of the CRT and numeracy tests were always counterbalanced. The conspiracy belief inventory came after. Participants completed demographic questions at the end of the study session.

Results

On average, the false conspiracies were only believed by a minority of participants ($M_{Study\ 5}$ = 21.4%; $M_{Study\ 6}$ = 39.1%; $M_{Study\ 7}$ = 22%; these represent the percentage of conspiracies that were rated as 'true' across participants). Despite this, participants who believed false conspiracies indicated (on average) that a *majority* of others *agreed* with them in each study ($M_{Study\ 5}$ = 59.5%; $M_{Study\ 6}$ = 67.8%; $M_{Study\ 7}$ = 59.8%). That is, conspiracy believers massively overestimated how much others agreed with them. This can be seen in Figure 3, which shows each individual conspiracy theory across the three studies. Although most conspiracy theories are only believed by a minority (clustering to the left of the x-axis), estimates of others' belief among believers is almost always in the majority (clustering to the top of the y-axis). Specifically, although conspiratorial claims were believed by a majority of participants in only 12% of 150 possible cases across the three studies, conspiracy believers thought themselves to be in the majority 93% of the time. Furthermore, in the few cases where believers indicated being in a minority, they nonetheless overestimated how much others agreed with them by a factor of 8.9, on average. Overall, across the 150 cases, believers overestimated others' agreement by a factor of 4.4. In contrast, non-conspiracists were actually quite accurate in predicting agreement (see Table 4). Interestingly, though, non-conspiracists somewhat *underestimated* how much others agreed with them about false conspiracy theories being false (in Studies 5 and 7, but not 6; Table 4). Furthermore, there was a general pattern of overestimated agreement for true conspiracies (whether or not participants believed them; Table 4); however, the effect was 1.4 to 2.3 times greater for belief in false conspiracies than belief in true conspiracies (all t's > 8.4, p's < .001). Thus, the overestimated agreement effect was uniquely robust among believers in false conspiracies.

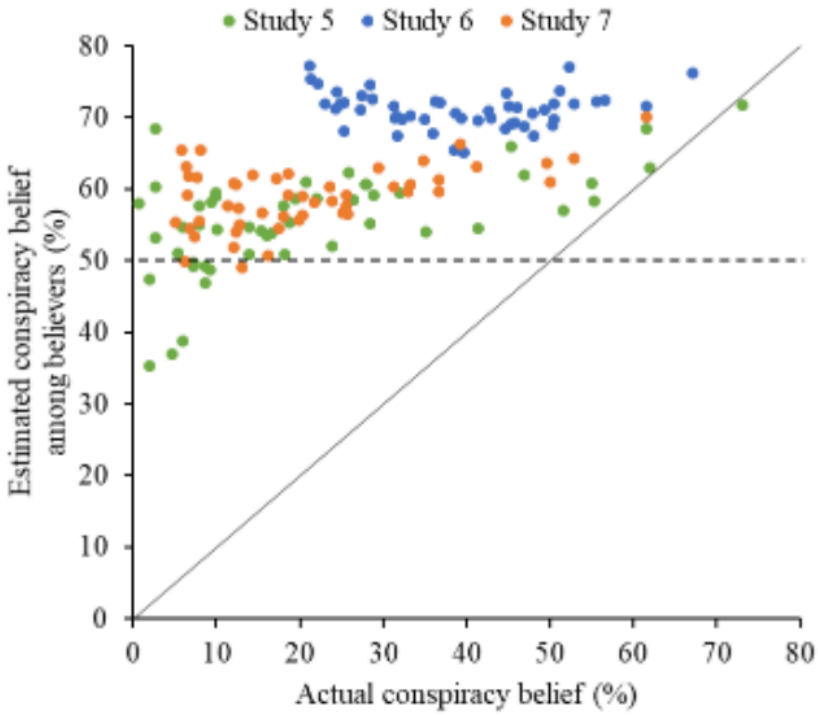

Figure 3. *Scatterplot displaying the extent to which conspiracy believers overestimated others' agreement. Each dot represents an individual conspiracy theory item in one of the three studies. The x-axis represents the actual level (%) of conspiracy belief in that sample – i.e., the percentage of participants who indicated thinking that the conspiracy is "true". The y-axis represents the estimated level (%) of conspiracy belief among believers (those who said "true" to false conspiracies). The diagonal line represents accurate calibration (i.e., if 30% believed a conspiracy, a calibrated estimate is 30%). The dotted line represents estimated majority position (above) or minority position (below).*

Table 4*. Mean levels of actual versus estimated agreement in false/true conspiracies in Studies 5-7. Percentages are broken up based on whether the claim was believed or disbelieved.*

		Actual agreement	Estimated agreement	Overestimated agreement
Believe in false conspiracies	Study 5	21.4%	59.5%	38.1%
	Study 6	39.1%	67.8%	28.7%
	Study 7	22%	59.8%	37.8%
Disbelieve in false conspiracies	Study 5	78.6%	72.4%	-6.2%
	Study 6	60.9%	68.9%	8%
	Study 7	78%	75.6%	-2.4%
Believe in true conspiracies	Study 5	49.3%	66%	16.7%
	Study 6	50.7%	71.1%	20.4%
	Study 7	47.8%	67.7%	19.9%
Disbelieve in true conspiracies	Study 5	50.7%	65.8%	15.1%
	Study 6	49.3%	65.4%	16.1%
	Study 7	52.2%	69.3%	17.1%

Conspiracy believers appear meaningfully unaware of how much their beliefs are on the fringe. Is this tendency associated with increased overconfidence? For this, we computed an "overestimated agreement" score for each subject by subtracting estimated agreement from actual agreement individually for each conspiracy theory in each study. Thus, a higher score for a subject indicates a greater propensity for that subject to judge that others agreed with them relative to what the actual level of agreement was (note that this is independent from whether one said 'true' or 'false' for the conspiracy claim). This overestimated agreement score (i.e., the difference between estimated agreement and actual agreement in cases where the individual believed a false conspiracy) was greater than 0 in all three studies, all t's > 15, p's < .001, d's = 1.9, 2.6, 2.6 for Studies 5, 6, and 7 respectively.

As is evident in Table 5, in Studies 6 and 7, this score correlated significantly with overconfidence using all three behavioral tasks and both overconfidence indices (i.e., the simple difference between actual and estimated performance on the task, "Overconfidence 1", and correlating estimated performance when controlling for actual performance in a regression, "Overconfidence 2"). However, there were no such effects in Study 5 – and the previously reported association between overconfidence and conspiracy belief (which had been replicated in the previous 4 studies) was also not observed in Study 5 (except for the perception test, which appears to be the strongest dispositional overconfidence measure; Binnendyk & Pennycook, 2023). Furthermore, as noted, participants actually did not overestimate their performance on the numeracy test in Study 5. This suggests that there was some idiosyncratic issue(s) with Study 5. Nonetheless, the overall balance of evidence clearly supports the conclusion that overconfidence is associated with both conspiracy belief and overestimated agreement with one's conspiracy beliefs.

Table 5. *Correlations (Pearson's r) between conspiracy beliefs (left), estimated other's conspiracy beliefs (middle), and overestimated agreement (right; i.e., the extent to which people overestimate how much others agree with them about conspiracies) and actual accuracy, estimated accuracy, and overconfidence on the three tasks in Studies 5-7. CRT = Cognitive Reflection Test. Overconfidence 1 = Estimated minus Actual accuracy. Overconfidence 2 = $r_{partial}$ correlation between estimated accuracy and the stated dependent variable after controlling for actual accuracy.*

		Conspiracy Beliefs			Overestimated Agreement		
Task	Measure	Study 5	Study 6	Study 7	Study 5	Study 6	Study 7
CRT	Actual Accuracy	-.18**	-.28***	-.37***	.11	-.11**	-.19***
	Estimated Accuracy	-.12*	.10*	-.10*	.05	.24***	.03
	Overconfidence 1	.09	.29***	.29***	-.06	.29***	.20***
	Overconfidence 2	-.06	.17***	.01	.02	.27***	.09*
Numeracy	Actual Accuracy	-.26***	-.31***	-.41***	.01	-.12**	-.22**
	Estimated Accuracy	-.16**	-.17***	-.16***	.08	.28***	.03
	Overconfidence 1	.12*	.37***	.31***	.08	.34***	.30***
	Overconfidence 2	.02	.27***	.12**	.09	.33***	.22***
Perception	Actual Accuracy	-.02	-.12**	-.07	-.03	-.09*	-.08
	Estimated Accuracy	.15**	.42***	.23***	.05	.35***	.32***
	Overconfidence 1	.13*	.40***	.20***	.06	.33***	.29***
	Overconfidence 2	.15**	.42***	.22***	.05	.35***	.32***

***$p \leq .001$, **$p \leq .01$, *$p \leq .05$

Finally, it should be noted that there is an association between conspiracy belief and overestimating others' agreement for false conspiracies in each study (r_{Study5} = .40; r_{Study6} = .45; r_{Study7} = .58, all p's < .001), such that conspiracy believers are more likely to also overestimate how much others agree with them. We therefore ran a series of regressions with overestimated agreement as the DV and belief in conspiracies and both actual and estimated performance as the IVs (see Table 6; note that these analyses were not preregistered but that this is similar to "Overconfidence 2" in Table 5, but with estimated agreement as the DV and conspiracy beliefs

as a control variable). The goal of this analysis is to investigate whether overconfidence independently predicts overestimated agreement once conspiracy belief has been taken into account. Consistent with this, we found that estimated performance – and not actual performance – significantly predicted overestimated agreement after controlling for conspiracy belief for all three tasks in Studies 6 and 7 (note that this is equivalent to "Overconfidence 2" in the above tables). That is, indicating that one is doing well on the task is associated with a heightened tendency to overestimate others' agreement even after taking into account how well one actually did on the task as well as their general tendency to believe (or disbelieve) in conspiracies. As above, Study 5 did not correspond with Studies 6 and 7. However, on balance, the results support a unique connection between overconfidence and overestimating how much others agree with you about conspiracies.

Table 6. *Regression analysis with overestimated agreement as the DV and actual performance, estimated performance, and conspiracy belief (as a control) as the IVs. This was done separately for the three tasks. Displayed are β indicating whether actual/estimated performance on the task predicts overestimated agreement while controlling for conspiracy belief. CRT = Cognitive Reflection Test.*

	Study 5	Study 6	Study 7
CRT Actual	.17***	-.04	.01
CRT Estimate	.04	.21***	.09*
Numeracy Actual	.05	-.06	-.11*
Numeracy Estimate	.11	.23***	.20***
Perception Actual	-.02	-.03	-.04
Perception Estimate	-.01	.20***	.20***

***$p \leq .001$, **$p \leq .01$, *$p \leq .05$

Study 8

In Studies 5-7, we found that overconfidence predicted both belief in conspiracies and the tendency to overestimate how much others believe in false conspiracies. Indeed, overestimated agreement was remarkably robust among conspiracy believers. In our final experiment, we had two goals. First, we investigated whether overconfidence predicts conspiracy beliefs and

overestimated agreement even after taking into account need for uniqueness and grandiose narcissism. Second, we applied a stress-test to the overestimated agreement finding: Participants were asked to indicate how much political counter-partisans agreed with them about conspiracies (i.e., Democrats were asked to estimate the average agreement among Republicans, and vice versa). This was contrasted with standard baseline ratings (as in previous experiments) and co-partisan ratings. Participants have a strong motivation to indicate that counter-partisans disagree with them; thus, if we nonetheless find that conspiracy believers overestimate agreement among counter-partisans, it would indicate that they hold a genuine belief that people broadly agree with them about conspiracies. We ask about ratings for co-partisans (in addition to the baseline ratings without a political label) to test whether overestimated agreement is nonetheless lower for out-group ratings.

Method

Participants

We recruited a target of 900 participants from Mechanical Turk (via Cloudresearch). In total, 1,030 entered the survey. Of these, 4 were removed for failing a trivial attention check question. Given our partisanship manipulation, we also removed people who indicated being "true" Independents. For this, participants were first asked to indicate which of the following that they most strongly identify with: Democratic, Republican, Independent, and Other. Those who gave a response other than Democratic or Republican were then asked "which do you tend to lean toward (e.g., when voting)?" with the options "I lean Democratic", "I lean Republican", and "I don't lean toward either". Those who chose the final option were removed from the study (N = 63). Finally, 5 participants dropped out prior to the conspiracy beliefs task and 31 participants failed to give an estimate for at least one of the cognitive tasks and were removed. The final

sample (M_{age} = 42) of 927 participants included 339 males, 250 females, and 3 who chose non-binary/other.

Materials and Procedure

The cognitive tasks (CRT, numeracy, and perception) and demographics were all identical to Study 7. Furthermore, the conspiracy belief items were also identical, with the exception that participants were assigned to one of three conditions for the estimated agreement task: 1) A baseline (control) condition where participants were asked: "What percentage of MTurkers do you think agree with you", 2) A Democrat condition where participants were asked: "What percentage of MTurkers who are Democrat do you think agree with you", or 3) A Republican condition where participants were asked: "What percentage of MTurkers who are Republican do you think agree with you". We then re-coded the conditions such that Democrats assigned to the Democrat condition and Republicans assigned to the Republican condition were considered to be in the "Co-partisan" treatment. Democrats who were assigned to the Republican condition and Republicans who were assigned to the Democrat condition were considered to be in the "Counter-partisan" treatment. Overestimated agreement was computed by using belief across all conditions.

Finally, we also included a Need for Uniqueness and grandiose narcissism measure. Need for Uniqueness was measured using a the 4-item "Self-Attributed Need for Uniqueness Scale" that asks questions such as "I have a need for uniqueness" and "I prefer being different from other people" (Lynn & Harris, 1997; Lynn & Snyder, 2002). Grandiose narcissism was measured using a 7-item scale where participants rated the extent to which several adjectives described them (on a scale from 1 – not at all to 7 – extremely) and it included items like "dominant", "superior" and "envied" (Rosenthal et al., 2020). A measure of dogmatism (van Prooijen &

Krouwel, 2016) was also included, but is not reported here as it was secondary to our hypotheses.

Results

We first focus on the results for the control condition, which is a replication of the previous studies but with the inclusion of grandiose narcissism and the need for uniqueness. As is evident from Table 7, belief in false conspiracies and overestimated agreement in false conspiracies were both negatively correlated with performance on the CRT and numeracy test, and positively correlated with overconfidence on all three tasks[5]. Grandiose narcissim and need for uniqueness were positively correlated with conspiracy beliefs, as expected.

***Table** 7. Correlations (Pearson's r) between major variables in Study 8 (control condition) N = 300. Overestimated agreement is among false conspiracy beliefs. CRT = Cognitive Reflection Test. Overconfidence = difference between estimated and actual performance on the stated task (i.e., "Overconfidence 1").*

	1	2	3	4	5	6	7	8	9
1. False Conspiracy Belief	-								
2. Overestimated Agreement	.54***	-							
3. CRT Accuracy	-.29***	-.20***	-						
4. Numeracy Accuracy	-.28***	-.20***	.62***	-					
5. Perception Accuracy	.10	-.02	.01	.02	-				
6. CRT Overconf	.26***	.23***	-.76***	-.37***	-.05	-			
7. Numeracy Overconf	.30***	.29***	-.23***	-.50***	-.07	.39***	-		
8. Perception Overconf	.15**	.26***	-.04	-.04	-.68***	.18**	.35***	-	
9. Grandiose Narcissism	.39***	.31***	-.13*	-.17**	-.05	.19**	.32***	.22***	-
10. Need for Uniqueness	.25***	.21***	-.14*	-.18**	.04	.12*	.26***	.13*	.41***

***$p \leq .001$, **$p \leq .01$, *$p \leq .05$

Given the overlap between variables and the strong correlation between conspiracy belief and overestimated agreement, we entered the full set in two regression analyses with false

[5] As in the previous studies, estimated performance predicted false conspiracy belief after taking into account actual performance (i.e., "Overconfidence 2") for the perception ($\beta = .15$, $p < .001$) and numeracy ($\beta = .14$, $p < .001$) tests, but not the CRT ($\beta = .02$, $p = .595$).

conspiracy belief or overestimated agreement in false conspiracies as the DVs (Table 8). In this case, we entered actual and estimated performance separately (i.e., a significant correlation with estimated performance after taking into account actual performance represents "Overconfidence 2" above). Also, we controlled for false conspiracy belief when entering overestimated agreement as the DV (as in Studies 5-7). Notably, estimated performance on the perception test emerged as a significant unique predictor for both false conspiracy belief and overestimated agreement[6]. This provides evidence that overconfidence is correlated with both conspiracy belief and overestimated agreement even after taking narcissism and the need for uniqueness into account. In contrast, need for uniqueness did not independently predict either factor, although narcissism and CRT performance were robust predictors of false conspiracy belief. In sum, false conspiracy belief was predicted by several factors – lower analytic thinking, greater overconfidence (on the perception test), and stronger grandiose narcissism – whereas overestimated agreement in false conspiracies was only predicted by greater overconfidence on the perception test.

Table 8. *Regression analyses (β) with false conspiracy belief (left) and overestimated agreement (right) as the DV's. For overestimated agreement, false conspiracy belief was also entered as a control. All IV's were entered simultaneously in the regression. Only data for the control condition is included. CRT = Cognitive Reflection Test.*

	False conspiracy belief	Overestimated agreement in false conspiracies
CRT Actual	-.19**	-.01
Numeracy Actual	-.12	-.08
Perception Actual	-.11*	-.08
CRT Estimate	-.01	.04
Numeracy Estimate	.03	.05
Perception Estimate	.18**	.20***

[6] Note that estimated performance on the numeracy test is not predictive of false conspiracy belief in this regression because it is included alongside the perceptual test estimate. If actual and estimated numeracy performance are entered by themselves in a regression predicting conspiracy belief (i.e., "Overconfidence 2), estimates are positively predictive (as in the previous studies): $\beta = .14, p < .001$.

Grandiose Narcissism	.28**	.03
Need for Uniqueness	.05	.02

***$p \leq .001$, **$p \leq .01$, *$p \leq .05$

Next we turn to our investigation of overestimated agreement across conditions. As in the previous studies, the false conspiracies were believed (on average) by a minority and this did not differ across conditions ($M_{counterpartisan}$ = 23.6%; $M_{Control}$ = 22.3%; $M_{copartisan}$ = 21%), F(2. 926) = .99, p = .371. Despite this, participants who believed false conspiracies indicated (on average) that a *majority* of others *agreed* with them in each condition ($M_{counterpartisan}$ = 53.1%; $M_{Control}$ = 58.9%; $M_{copartisan}$ = 63.2%). Thus, the overestimated agreement score (i.e., the difference between estimated agreement and actual agreement in cases where the individual believed a false conspiracy) was greater than 0 in all three conditions, all t's > 12, p's < .001, d's = 1.5, 2.6, 3.4 for the counter-partisan, control, and co-partisan conditions respectively. As can be seen in Figure 4, conspiracy believers once again massively overestimated how much others agreed with them – even when they were rating agreement among counter-partisans. Nonetheless, there was a sizeable difference across conditions in terms of overestimated agreement among those who believed in false conspiracies, F(1,770) = 21.61, MSE = 307.7, p < .001, such that overestimated agreement was lower in the counter-partisan condition relative to the control, t(538) = 3.60, p < .001, d = .31, and the co-partisan condition was greater than the control, t(490) = 3.22, p = .001, d = .29. As can be seen in Figure 3, conspiracy believers estimated that a majority of fellow MTurkers (control) and co-partisans agreed with them even in cases where very few actually did. Although conspiracy believers overestimated how much counter-partisans agreed with them, they did not indicate that they were in the majority among counter-partisans (i.e., estimated agreement was generally below 50%, even if it was nonetheless much higher than actual agreement).

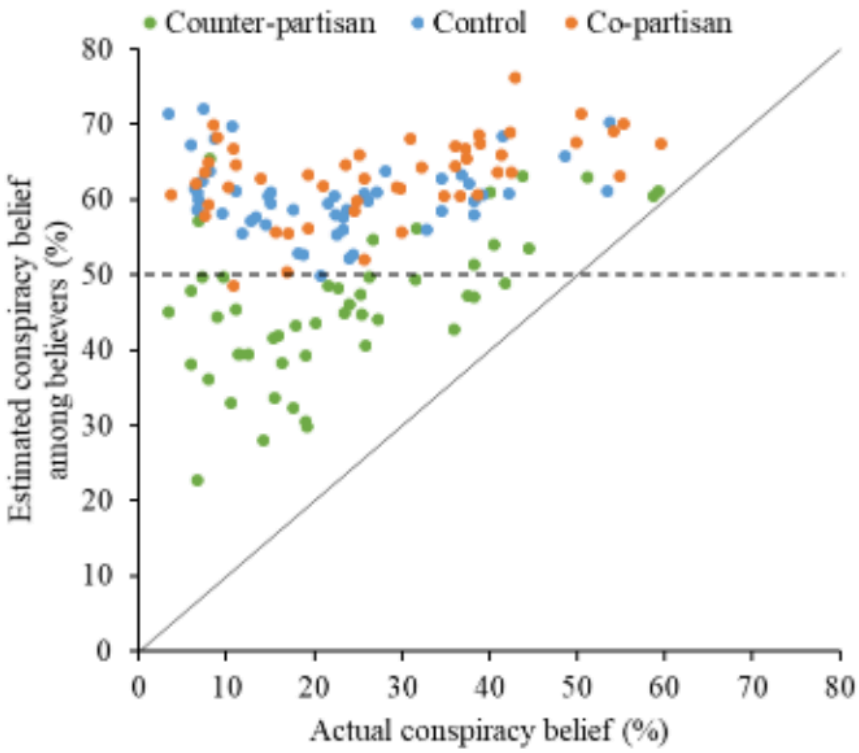

Figure 4. *Scatterplot displaying the extent to which conspiracy believers overestimated others' agreement. Each dot represents an individual conspiracy theory item in one of the three conditions. The x-axis represents the actual level (%) of conspiracy belief in that sample. The y-axis represents the estimated level (%) of conspiracy belief among believers (those who said "true" to false conspiracies) in that sample. The diagonal line represents accurate calibration (i.e., if 30% believed a conspiracy, a calibrated estimate is 30%). The dotted line represents estimated majority position (above) or minority position (below).*

Discussion

Conspiracy beliefs have been characterized as an almost rational or reasonable consequence of various needs and motivations. Our findings support an alternative perspective in which conspiracy beliefs emerge from maladaptive patterns of reasoning that lead people to hold views that may be unlikely to be true. Across 8 studies, we found that conspiracy believers tend to not only be less analytic in the way that they think, but also more overconfident. Furthermore, overconfidence was most strongly related to conspiracies that were most heavily on the fringe. This was not the case for conspiracies that actually occurred, such as the Tuskegee syphilis

study, indicating that the association has more to do with the evidential status of the claim and not whether it is a conspiracy *per se*.

Overconfidence nonetheless has the potential to explain much about what it means to believe false or unverified conspiracies. Specifically, overconfidence may lead those who believe false conspiracies to not only be unaware that their beliefs suffer from a lack of evidence, but also to be unaware that others do not hold the same beliefs. Indeed, we found that conspiracy believers massively overestimated how much others agreed with them (Cohen's *d*'s varied from 1.5-3.4). This finding is anticipated by past research on the false consensus effect (Ross et al., 1977) – including work showing that the false consensus effect is greatest for those who hold minority views (Mullen et al., 1985). Nonetheless, what is striking here is the magnitude of the overestimation: Even though conspiracy beliefs were in the majority in only 12% of 150 cases across Studies 5-7, conspiracy believers thought themselves to be in the majority 93% of the time. This effect was even evident when conspiracy believers were asked to rate agreement among counter-partisans (i.e., Democrats estimating agreement among Republicans and vice versa), albeit to a lesser extent. Furthermore, this massively overestimated agreement was not observed when people disbelieved conspiracies or when conspiracies were true, indicating that conspiracy believers were particularly prone to this false consensus effect. Critically, the tendency to overestimate agreement was itself (in Studies 6-8, but not 5) associated with overconfidence even after taking conspiracy beliefs into account. Thus, overconfidence may lead people to not only believe in conspiracies but also to be unaware that others disagree with them.

As noted, these findings have implications for the psychology of conspiracy beliefs. Although it may nonetheless be the case that conspiracies fulfill various needs and motivations (Sternisko et al., 2020), we found that the need for uniqueness did not predict conspiracy beliefs

once overconfidence, analytic thinking, and grandiose narcissism were taken into account. Furthermore, the only consistent predictor of overestimated agreement among conspiracy believers was overconfidence. Thus, although past work has shown that conspiracy believers identify with being unique or special (Imhoff & Lamberty, 2017; Lantian et al., 2017) – and that reporting knowledge of "secret plots" (as is typical of conspiracies) is consistent with this – conspiracy believers may also hold such strong views that they nonetheless expect that most people would surely agree with them. Indeed, overconfidence may undermine believers ability to detect the conflict between these views (see Pennycook et al., 2014 for a related discussion in the context of religious beliefs). This is indirectly supported by correlational evidence that analytic thinking moderates (i.e., reduces) the effect of narcissism on conspiracy beliefs (Cosgrove & Murphy, 2023).

Our research points to a fundamental problem when it comes to undermining false belief in conspiracies: The people who most need help distinguishing truth from falsity are the least likely to recognize that they need it. This relates to previous work on the Dunning-Kruger effect, where people who are most incompetent are the least able to recognize their incompetence (Dunning, 2011; Kruger & Dunning, 1999). However, our findings suggest that this issue runs even deeper, as we show that the underlying *disposition* to be overconfident on an entirely unrelated task predicts belief in conspiracies. Although some question whether overconfidence is a legitimate individual difference (Moore & Dev, 2018), we nonetheless find consistently strong predictive validity (see also Binnendyk et al., 2024; Binnendyk & Pennycook, 2024).

Our findings also have broader implications for research relating to overconfidence and how it is measured. Much past work has focused on the raw difference between actual and estimated performance as an index of overconfidence. Although this does provide an

interpretable estimate for the scope of overconfidence, this score ("Overconfidence 1" above) is heavily influenced by performance such that people who do poorly on a given measure will have the appearance of very high overconfidence (i.e., the Dunning-Kruger Effect; Dunning, 2011; Kruger & Dunning, 1999). We investigate two approaches to address this issue.

First, instead of using overconfidence scores, we used estimated performance to predict our outcome while controlling for actual performance ("Overconfidence 2"). This is a more conservative approach and, in the case of the Cognitive Reflection Test, produced different results than the standard approach. This demonstrates the value of assessing overconfidence in this way: Although CRT overconfidence estimated using difference scores appeared to predict conspiracy theory beliefs, this effect was not present when CRT overconfidence was estimated using a joint-testing regression method. Interestingly, there are reasons to believe that this pattern occurs specifically because the CRT is the wrong sort of task to measure dispositional overconfidence. Past work has shown that people who get CRT problems wrong are often not aware that there is a "trick" to the problems (Mata et al., 2013) – and, thus, the confound between performance and overconfidence is particularly strong. Put differently, the CRT was specifically designed to generate confident incorrect answers, which artificially increases confidence among people who perform poorly and thereby undermines the utility of CRT estimated performance as a measure of dispositional overconfidence.

The second way that we addressed the performance-confound issue is by using a task that does not fall prey to this issue. In particular, participants have no way of knowing how well they are doing on the perceptual test that we administered (i.e., the "Generalized Overconfidence Task"; GOT); as a result, their estimated performance is a more direct measure of their dispositional overconfidence. This measure emerged as the most robust when tested against the

other measures (i.e., in Study 8; see also Binnendyk & Pennycook, 2024). Furthermore, estimated performance on the numeracy test was consistently correlated with estimated performance on the perception test (once performance was taken into account in a regression analysis; across studies, all β's > .24, p's < .005), but the same was not true for estimated performance on the CRT (across studies, all β's < .08, p's > .058). So, although it is best to use a non-confounded task (such as our perception test), overestimated performance on the numeracy test does appear to index of dispositional overconfidence (whereas the same is not true for the CRT).

Naturally, there are important limitations to this work (see Table 9). Foremost, people who are the most conspiratorial may not be present using the online data sources that we used. This is a fundamental limitation for much research on conspiracy beliefs, however: Those who are the most deeply distrustful of authority may not be particularly keen on completing studies for "ivory tower" universities. Another issue relates to the way that we measured overconfidence here. We asked participants to estimate how correct they are (i.e., "overestimation"), but questioning one's beliefs may relate more strongly to how confident people are that they are correct on a case-by-case basis (Moore, 2022). Future research should test for generalizability by using different ways of assessing overconfidence (including in other domains, e.g., general knowledge; see Lawson et al., 2023).

Table 9.
Assessment of Limitations.

Dimension	Assessment
Internal validity	
Are the phenomena diagnosed with experimental methods?	Yes, we manipulated political consistency to test the robustness of the overestimated agreement effect in Study 8. The design was otherwise correlational.
Are the phenomena diagnosed with longitudinal methods?	No

Dimension	Assessment
What possible artifacts were ruled out?	We produced analyses showing that the findings relating to overconfidence were not due to (mere) differences in cognitive ability or style. We also took grandiose narcissism and the need for uniqueness into account in Study 8.
Statistical validity	
Was the statistical power at least 80%?	The smallest sample was N=295, which is 80% power for effect sizes as small as $r = .161$.
Was the reliability of the dependent measure established in this publication or elsewhere in the literature?	Yes, reliability was high for our conspiracy belief measure in each study (Cronbach's $\alpha > .90$).
Were the distributional properties of the variables examined and did the variables have sufficient variability to verify effects?	Yes
Generalizability to different methods	
Were different operationalizations of core concepts used?	We measured overconfidence using two statistical approaches and three measures. Results supported conclusions consistently for two out of three measures, for reasons outline in the main text.
Generalizability to field settings	
Was the phenomenon assessed in a field setting?	No
Are the methods artificial?	We assessed overconfidence by having participants provided estimates of their performance on cognitive tasks. This is artificial in a way, but also something that is easily understood for participants. Belief in conspiracy theories and estimated agreement were also assessed directly.
Generalizability to times and populations	
Are the results generalizable to different years and historic periods?	We complemented "historical" conspiracy beliefs (e.g., that the moon landing was a hoax) with "contemporary" conspiracies, but we did not test across different historical periods.
Are the results generalizable across populations (e.g., different ages, cultures, or nationalities)?	All studies were completed using U.S. participants recruited via online survey panels. We cannot generalize our results to other cultures or nationalities.
Theoretical limitations	
What are the main theoretical limitations?	Conspiracy beliefs are surely multiply determined and change over time. We investigated a set of

Dimension	Assessment
	predictive factors, but longitudinal data tracking how overconfidence impacts beliefs over time would provide a more direct test of our hypotheses. We also assessed overconfidence relating to overestimation but could also look at more ways of assessing overconfidence (including different outcomes and different tasks). Finally, conspiracy theorists may not be particularly likely to sign up for psychology studies, thus limiting our ability to generalize.

Conclusion

Why do people believe dubious conspiracy theories? Although some research supports the idea that conspiracies fulfill important needs and motivations, our findings support the argument that an important element of conspiracy belief is cognitive. We find that conspiracy believers are characterized by weaker analytic reasoning skills and, just as much, by a stronger disposition to toward overconfidence. This overconfidence is also linked with a propensity to be largely unaware that most others disagree about believed conspiracy theories. This has implications for efforts to undermine the influence of misinformation as those who are the most in need of intervention are likely the least willing to recognize that they may be wrong – and, in fact, may feel like they have relatively strong social support in their beliefs.

Author Note & Competing interests

Data, materials, and preregistrations for all studies are available on OSF. The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix A

List of conspiracies across studies

List of conspiracy items and studies that they were used in separated by veracity.

False Items	Studies used
Area 51 in Nevada, US, is a secretive military base that contains hidden alien spacecraft and/or alien bodies.	1, 2, 3, 4, 5, 6, 7
A powerful and secretive group, known as the New World Order, are planning to eventually rule the world through an autonomous world government, which would replace sovereign government.	1, 2, 3
Government agencies in the UK are involved in the distribution of illegal drugs to ethnic minorities.	1, 2, 3
In July 1947, the US military recovered the wreckage of an alien craft from Roswell, New Mexico, and covered up the fact.	1, 2, 3
Princess Diana's death was not an accident, but rather an organised assassination by members of the British royal family who disliked her.	1, 2, 3
SARS (Severe Acute Respiratory Syndrome) was produced under laboratory conditions as a biological weapon.	1, 2, 3
Special interest groups are suppressing, or have suppressed in the past, technologies that could provide energy at reduced cost or reduced pollution output.	1, 2, 3
The Apollo moon landings never happened and were staged in a Hollywood film studio.	1, 2, 3
The assassination of John F. Kennedy was not committed by the lone gunman, Lee Harvey Oswald, but was rather a detailed, organised conspiracy to kill the President.	1, 2, 3
The assassination of Martin Luther King, Jr., was the result of an organised conspiracy by US government agencies such as the CIA and FBI.	1, 2, 3
The Coca Cola company intentionally changed to an inferior formula with the intent of driving up demand for their classic product, later reintroducing it for their financial gain.	1, 2, 3
The Oklahoma City bombers, Timothy McVeigh and Terry Nichols, did not act alone, but rather received assistance from neo-Nazi groups.	1, 2, 3
The US government allowed the 9/11 attacks to take place so that it would have an excuse to achieve foreign (e.g., wars in Afghanistan and Iraq) and domestic (e.g., attacks on civil liberties) goals that had been determined prior to the attacks.	1, 2, 3

The US government had foreknowledge about the Japanese attack on Pearl Harbour, but allowed the attack to take place so as to be able to enter the Second World War.	1, 2, 3
US agencies intentionally created the AIDS epidemic and administered it to black and gay men in the 1970s.	1, 2, 3
A cure for cancer was discovered years ago, but this has been suppressed by the pharmaceutical industry and the U.S. Food and Drug Administration (FDA).	3, 4, 5, 6, 7
An individual or group of individuals known as QAnon have access to the Trump administration and have been revealing classified (top secret) information to the public through the websites 4chan and 8chan.	3, 4, 5, 6, 7
Barack Obama is a secret Muslim who was born in Kenya, not the United States.	3, 4, 5, 6, 7
Electric car technology is far more advanced than people realize, but this fact has been suppressed by the fossil fuel industry.	3, 4, 5, 6, 7
Governments put flouride in public water sources because it helps control the masses.	3, 4, 5, 6, 7
Monsanto and other agribusinesses have suppressed data showing that “genetically modified organisms” (GMO’s) cause harm to those who eat them.	3, 4, 5, 6, 7
The 2012 mass shooting at Sandy Hook Elementary School was staged by actors and never actually happened.	3, 4, 5, 6, 7
The claim that the climate is changing due to emissions from fossil fuels is a hoax perpetrated by corrupt scientists who want to spend more taxpayer money on climate research.	3, 4, 5, 6, 7
The Earth is flat (not spherical) and this fact has been covered up by scientists and vested interests.	3, 4, 5, 6, 7
The systematic murder of Jewish people (among others) by Nazi Germany during World War II (known as the "holocaust") did not actually occur.	3, 4, 5, 6, 7
There is a causal link between vaccination and autism that has been covered up by the pharmaceutical industry.	3, 4, 5, 6, 7
5G technologies are bad for human health and are responsible for the spread of COVID-19.	4, 5, 6, 7
Bill Gates is trying to build a huge surveillance state using COVID-19 vaccinations.	4, 5, 6, 7
Billionaire George Soros paid people to protest against the Trump Administration.	4, 5, 6, 7

COVID-19 is a hoax.	4, 5, 6, 7
Dinosaurs never existed, evolution is not real, and scientists have been faking the fossil record.	4, 5, 6, 7
Doctors are being paid/forced to report all deaths as COVID-19 deaths.	4, 5, 6, 7
Dominion voting machines used in some states were programmed to either flip votes to favor Biden or delete votes for Trump in the 2020 U.S. Election.	4, 5, 6, 7
Donald Trump has been secretly fighting a group of child sex traffickers that include prominent Democrats and Hollywood elites.	4, 5, 6, 7
FEMA has equipment that they plan to use to funnel poor people into concentration or "FEMA camps".	4, 5, 6, 7
Feminism is a conspiracy to decrease the White birth rate in order to endanger the West.	4, 5, 6, 7
Greta Thunberg is an actress and not a genuine climate activist.	4, 5, 6, 7
Hillary Clinton was involved in a secret child sex ring for high ranking officials in the Democratic Party (commonly known as "Pizzagate" in connection to the use of a U.S. pizza restaurant as the front for the organization).	4, 5, 6, 7
HIV/AIDS was created by the U.S. government as a bioweapon targeting Africans and/or African Americans.	4, 5, 6, 7
Hydroxychloroquine has been demonstrated to be a safe and effective treatment of COVID and this information is being suppressed.	4, 5, 6, 7
Jeffrey Epstein didn't kill himself.	4, 5, 6, 7
Jews are plotting to establish control over the world and dominate it by promoting capitalism.	4, 5, 6, 7
Lee Harvey Oswald did not act alone in the Kennedy assassination and other entities were involved (e.g., CIA, KGB, mafia).	4, 5, 6, 7
North Korean leader, Kim Jong-Un, was installed by the CIA.	4, 5, 6, 7
Pedophiles are systematically grooming children through disturbing videos on YouTube and elsewhere.	4, 5, 6, 7
Planned Parenthood is rooted in eugenics and disproportionately targets Black women in order to decrease the number of African-American people.	4, 5, 6, 7
Princess Diana was murdered by the British Royal Family because she was about to marry Dodai El-Fayd.	4, 5, 6, 7
Proof of alien contact is being concealed from the public.	4, 5, 6, 7

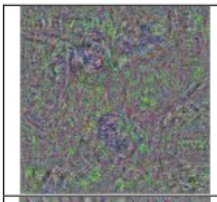
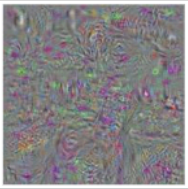
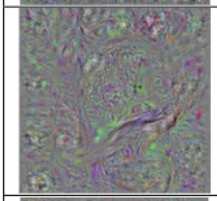
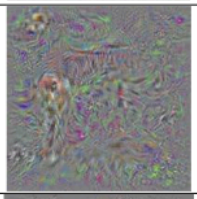
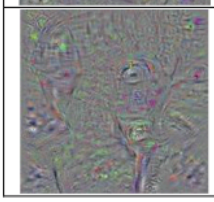
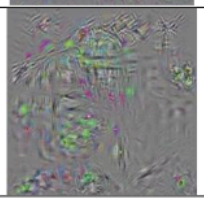
Technology with mind-control capacities is used on people without their knowledge.	4, 5, 6, 7
The Apollo moon landings were staged in a Hollywood film studio.	4, 5, 6, 7
The Boston Marathon bombings were perpetrated by the U.S. government through a black ops mercenary unit.	4, 5, 6, 7
The Clintons are responsible for murdering a variety of political rivals including Vince Foster.	4, 5, 6, 7
The coronavirus that causes COVID-19 was engineered as a bioweapon in a Chinese lab.	4, 5, 6, 7
The COVID vaccines affect fertility and this is being covered-up.	4, 5, 6, 7
The Earth is entirely hollow or contains a substantial interior space (this is also known as the "Hollow Earth" theory).	4, 5, 6, 7
The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret.	4, 5, 6, 7
The power held by heads of state is second to that of small unknown groups who really control world politics.	4, 5, 6, 7
The Rothschild family leads a satanic cult.	4, 5, 6, 7
The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of vested interests.	4, 5, 6, 7
The violence that occurred when the Capitol Hill was stormed on January 6th was actually caused by Antifa and not supporters of Donald Trump.	4, 5, 6, 7
The visible condensation trails behind airlines ("chemtrails") are evidence of deliberate spraying for evil purposes (most commonly either deliberate de-population or weather control).	4, 5, 6, 7
There is a "deep state" in the United States that is controlled by a secret power elite who act in coordinated manipulation of the nation's politics and government.	4, 5, 6, 7
There were many millions of fraudulent votes cast in the 2020 U.S. Election.	4, 5, 6, 7
While Joe Biden was vice president of the United States he engaged in corrupt activities relating to the employment of his son Hunter Biden by the Ukrainian gas company Burisma.	4, 5, 6, 7
Billionaire George Soros has funded migrants from Central American so that they can illegally enter the United States.	3

Hillary Clinton and her associates instigated the murder of Seth Rich because he was responsible for releasing confidential emails from the Democratic National Committee.	3
A restricted campground (known as 'Bohemian Grove') hosts a two-week encampment annually of prominent men in the world.	4
True Items	**Studies used**
The U.S. government secretly employed more than 1,600 German scientists, including former leaders of the Nazi Party, between 1945 and 1959.	4, 5, 6, 7
The US Department of the Treasury poisoned alcohol during Prohibition causing people to die.	4, 5, 6, 7
The US government sold weapons to Iran (known as the "Iran-Contra affair"), violating an embargo, and used the money to support Nicaraguan militants.	4, 5, 6, 7
For decades, tobacco companies buried evidence that smoking is deadly.	4, 5, 6, 7
The Nixon administration continuously attempted to cover up its involvement in the break-in of the Democratic National Committee headquarters at the Washington, D.C. Watergate Office Building.	4, 5, 6, 7
A criminal conspiracy by the Church of Scientology during the 1970s aimed to purge unfavorable records by infiltration and theft from government agencies, foreign embassies, etc.	4, 5, 6, 7
The FBI was spying on former Beatle John Lennon.	4, 5, 6, 7
In 1953 the United States Atomic Energy Commission examined the impact of radioactive fallout on the world's population and was stealing parts of dead bodies to conduct the research.	4, 5, 6, 7
In the 1950s and 1960s more than 100 million Americans received a polio vaccine contaminated with a potentially cancer-causing virus.	4, 5, 6, 7
The Dalai Lama received a six-figure salary during the 1960s from the U.S. government.	4, 5, 6, 7
Military leaders reportedly planned terrorist attacks in the US to drum up support for a war against Cuba.	4, 5, 6, 7
A public-relations firm organized congressional testimony that propelled US involvement in the Persian Gulf War.	4, 5, 6, 7
The US Public Health Service conducted unethical research and lied about treating black men with syphilis for more than 40 years (commonly known as the "Tuskegee Experiment").	4, 5, 6, 7

Parts of the Gulf of Tonkin Incident, which led to US intervention in Vietnam, never happened.	4, 5, 6, 7
A top-secret CIA project (commonly referred to as "MK-Ultra") tested the effects of LSD on unwitting citizens.	4, 5, 6, 7

Appendix B

Perception test images and response options

	chimpanzee or baseball player		firestation or confectionary
	eel or tiger shark		horse or golden retriever
	parking meter or stop sign		barn or greenhouse