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## Believing in nothing and believing in everything: The underlying cognitive paradox of anti-COVID-19 vaccine attitudes

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## ABSTRACT

A major reason why some people oppose the COVID-19 vaccine is the influence of misinformation. This study suggests that the cognitive paradox of simultaneously believing known facts less and new, “alternative facts” more is the outcome of a distrust mindset, characterized by spontaneous consideration of alternatives, including misinformation. We captured this paradox and its correlates in a scale that measures individuals' ability to distinguish between the truth value of well-established facts (“Earth rotates eastward around its own axis, completing a full rotation once in about 24 h”) and baseless “alternative facts” (“Earth can change its rotation direction and flip its axis, and we will never notice it”). Assuming that an anti-COVID-19 vaccine attitude arises from a chronically distrusting mindset, we sampled participants on Prolific who were pre-screened for their COVID-19 vaccine attitude based on earlier responses. We found that people who rejected COVID-19 vaccines believed well-established facts less, and “alternative facts” more, compared to supporters of the vaccine. Less discernment between truths and falsehoods was correlated with less intellectual humility, more distrust and greater reliance on one's intuition. This observed thought pattern offers insights into theoretical understanding of the antecedents of belief in “alternative facts” and conspiracy theories.

### 1. Introduction

In many societies it appears that even the most basic, agreed-upon facts of our shared reality are being disputed. Is there really a pandemic or is COVID-19 a hoax? Are the vaccines safer than the disease itself? The erosion of agreed-upon foundations of our society gravely affects social cohesion and hinders the ability to cooperate and advance towards shared goals (Dugas & Kruglanski, 2018). An observable characteristic of this erosion is that many people simultaneously believe consensually accepted mainstream facts less and “alternative facts” (i.e., demonstrable falsehoods) more. Despite the widely held belief that this is a phenomenon of the age of social media, philosopher Hannah Arendt identified this paradox in 1951, in her seminal analysis of totalitarianism: “In an ever-changing, incomprehensible world the masses had reached the point where they would, at the same time, believe everything and nothing, think that everything is possible and that nothing was true” (Arendt, 1951).

Thus far, the phenomenon of believing mainstream claims less while believing “alternative facts” more has been mainly attributed to

individual or group dispositions and motivations, such as wanting exclusive knowledge of an event or its causes, a need for clarity and certainty in the face of an overwhelmingly intimidating situation (Douglas et al., 2017; Miller & Saunders, 2016; Wood et al., 2012) or the expression of dismay (Poon et al., 2020). These explanations apply only to specific topics or contexts; people question the mainstream claim (e.g., the vaccine is safe) and believe an alternative claim (e.g., the vaccine has a 5G chip). By contrast, we suggest that the phenomenon of simultaneously disbelieving facts while believing any “alternative fact” can occur even when encountering novel information, unrelated to needs for assurance, prior knowledge, attitudes, fears or challenges to one's worldview. Specifically, the current research suggests that there is a basic cognitive pattern of “believing in nothing and believing in everything”, which is the result of a distrusting mindset that diverges from the basic acceptance (belief) bias. Understanding and analyzing this specific cognitive pattern may offer new insights into the belief and spread of “alternative facts”.

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### 1.1. Spontaneous acceptance of information

According to extant research, acceptance tends to occur spontaneously when people process information, whereas rejection of information as false is thought to involve a secondary process demanding motivation and cognitive resources (Gilbert, 1991). This acceptance bias may well be the cognitive basis for the great difficulty of negating misinformation (for a review see Rapp & Braasch, 2014). Ample research shows the grave implications and lingering effects of misinformation, which persist in the face of various correction and inoculation (“pre-bunking”) techniques (Chan et al., 2017; Ecker et al., 2011; Gilbert et al., 1990; Gilbert et al., 1993; Johnson & Seifert, 1994, 1998; Wilkes & Reynolds, 1999), and despite explicit knowledge of misinformation’s inaccuracy (Fazio et al., 2015; Gilbert et al., 1993; Lewandowsky, 2021; Lewandowsky et al., 2012) – even if it contradicts factual, a-priori knowledge (Fazio et al., 2015; Rapp, 2016). The mere exposure to false information makes subsequent true information seem less real, essentially canceling out the positive effects of the correct information, even if the participant knowingly rejects the false information (Lewandowsky et al., 2017; McCright et al., 2016; van der Linden et al., 2017).

However, this explanation is content-specific: people believe misinformation when encountering it due to the acceptance bias, and subsequent accurate information that counters the false claim is less impactful. Although the acceptance bias can explain the acceptance and persistence of misinformation, it cannot explain *less belief* in facts when no alternative misinformation is present, nor can it explain a person’s *greater belief* in misinformation that is a new alternative to well-known facts. In this research we hypothesize that the explanation for this asymmetric belief pattern lies in a type of cognition different from the acceptance bias, namely one that characterizes a distrust mindset.

### 1.2. Distrust mindset

The situated cognition perspective (Schwarz, 2002; Smith & Semin, 2004) holds that cognition changes with context. If trust means taking things at “face value”, cognition should be congruent, with acceptance and belief being its primary process. If distrust means not taking things at “face value”, cognition should be incongruent, with rejection and disbelief as the primary processes (Mayo, 2015). Indeed, research has demonstrated that in a distrust mindset, people spontaneously think of alternatives to incoming information (Kleiman et al., 2015; Mayer & Mussweiler, 2011; Posten & Mussweiler, 2013; Schul et al., 2004). For example, in a trust mindset, participants responded faster to target words (“transient”) following a congruent prime (“temporary”) than an incongruent one (“permanent”). However, in a distrust mindset, participants responded faster to targets (“transient”) following an incongruent prime (“permanent”) than following a congruent one (“temporary”) (Schul et al., 2004). Moving beyond priming tasks to real-world information, we hypothesize that people with a chronically distrusting mindset will spontaneously think of “alternative facts” even when exposed to undisputed, familiar facts. This pattern of cognition leads to the paradox of concurrently believing mainstream facts less and “alternative facts” more, resulting in a reduced ability to tell truth from falsehood (truth discernment) that extends beyond specific topics.

### 1.3. Current study

In this study we examine whether distrusting individuals manifest the cognitive paradox of “believing in nothing and believing in everything”. To test our claim that this is a general pattern of thought, we examine this hypothesis not in the context of specific controversial issues (e.g., COVID-19 vaccinations or political differences), which are influenced by existing beliefs and attitudes, but in the context of consensually accepted information. We created a new scale that includes well-accepted truths with no known alternative account (e.g., “Earth

rotates eastward around its own axis, completing a full rotation once in about 24 h”) and new claims that are alternatives to well-accepted truths (e.g., “Earth can change its rotation direction and can flip its axis, and we will never notice it”).

We operationalized a general chronically distrusting mindset by using pre-existing anti-COVID-19 vaccine attitudes as a proxy. We hypothesized that the paradox of “believing in nothing and believing in everything” will be present in those opposing the vaccine but not in supporters of it, and that distrusting individuals will believe mainstream information about our shared reality less and consider alternatives more – resulting in a reduced ability to discern truth and falsehood. We do not hypothesize that distrusting individuals will be skeptical of everything and reject all information presented to them, nor that they will be gullible and believe anything they are exposed to. Rather, the cognitive paradox we are examining is that of believing well-accepted, well-established truths less and, more importantly, showing a greater tendency to accept false novel claims simply because they are an alternative to widely acknowledged facts.

## 2. Method

We ran our study (preregistered at [https://aspredicted.org/JTQ\\_QUN](https://aspredicted.org/JTQ_QUN)) using the online survey platform Prolific, where participants reported their vaccine attitude in the weeks prior to the study as part of a demographic information update. This allowed us to sample participants according to their vaccine attitude without having to probe these attitudes explicitly, thus avoiding possible motivational biases.

### 2.1. Participants

A total of 418 native English speakers, between 18 and 40, took part in the study (219 women,  $M_{age} = 28.8$ ) during April 2021, when only about 25% of the U.S. population had received two doses of the vaccine.<sup>1</sup> We set an age maximum of 40, because at the time, the perception was that COVID-19 is extremely dangerous for older people, making the vaccine necessary for them; thus an age difference between the opposing/supporting groups was a relevant concern, as those pro-vaccine might have been older than those against. Participants were sampled based on their pre-screened self-reported attitude towards the COVID-19 vaccine (opposing or supporting it, measured by Prolific weeks prior to the study) and were randomly assigned to stimulus Set A or Set B. The sets differed only in the version of each item presented in the “believing in nothing and believing in everything” scale: factual items in Set A were presented as “alternative facts” in Set B and vice versa. All other demographic variables and the remainder of the questionnaire were identical. Following our preregistration criteria, we excluded participants who indicated that they were inattentive, distracted ( $n = 8$ ) or that their data should not be used ( $n = 3$ ). We also excluded participants who admitted to searching for the statements online ( $n = 15$ ), as this might introduce additional variance caused by prior knowledge that influenced which statements participants searched for and the responses found online. The final sample included 182 participants opposing the vaccine and 236 supporting it. Of the total, 137 identified as independent or specified no affiliation, 85 as Republicans and 196 as Democrats.

### 2.2. Materials

#### 2.2.1. “Believing in nothing and believing in everything” scale

We randomly selected 10 general-knowledge topics and created a true (fact) and false (“alternative fact”) statement for each, e.g., women’s vote, gold’s scarcity, Earth’s rotation, stock market crashes (all items

<sup>1</sup> <https://www.nytimes.com/interactive/2020/us/covid-19-vaccine-doses.html>.

appear in [Appendix 1](#)). The items include 10 well-established historical or scientific truths that form part of American cultural reality (“The 19th Amendment to the U.S. Constitution granted women the right to vote following widespread protests”) and an alternative, false account for each statement (“Women always had the right to vote, they abstained from doing so for diverse reasons”). The 20 statements were randomly divided into two complementary sets (A and B), with each set's statements being half true and half false, presenting only one version of a particular statement to each participant. Participants rated the perceived veracity of the statements on a scale from 1 (“False”) to 6 (“True”).

### 2.2.2. Additional scales

We measured six additional constructs to capture the role of different personal dispositions, which previous research identified as being diagnostic in revealing people's susceptibility to misinformation, conspiracy theories or distrust of official accounts ([Lewandowsky, 2021](#)). These scales are<sup>2</sup>: Reliance on Intuition ([Lewandowsky, 2021](#)) (five items, Cronbach's  $\alpha = 0.547$ ), Distrust ([Yamagishi, 1988](#)) (six items, Cronbach's  $\alpha = 0.806$ ) with responses between 1 (“Strongly disagree”) and 5 (“Strongly agree”), Need for Chaos ([Petersen et al., 2018](#)) (eleven items, Cronbach's  $\alpha = 0.842$ ), measuring individuals' wishes to unleash chaos and “burn down” the established political order in hopes of gaining status, and Generic Conspiracist Beliefs ([Brotherton et al., 2013](#)) (fifteen items, Cronbach's  $\alpha = 0.957$ ) with responses between 1 (“Strongly disagree”) and 7 (“Strongly agree”).

Also, we used two measurements of Intellectual Humility to ensure that we captured different dimensions of the trait: [Leary et al.'s \(2017\)](#) scale measures intellectual humility directly in terms of one's own relation to knowledge, while [Alfano et al.'s \(2017\)](#) items emphasize the relation to others' knowledge (all items available in <https://osf.io/wjz4/>). The responses in Alfano's scale range from 1 (“Not at all true or characteristic of me”) to 5 (“Extremely true or characteristic of me”) (six items, Cronbach's  $\alpha = 0.793$ ); and responses in Leary's scale ranged between 1 (“Strongly disagree”) and 7 (“Strongly agree”) (six items, Cronbach's  $\alpha = 0.861$ ). To assess participants' concern, opposition to and understanding of vaccines, we adapted questions from [Fernbach et al. \(2019\)](#), changing only the topic of GMOs in the original scale to identical questions regarding vaccines.<sup>3</sup> Finally, participants answered demographic questions and indicated their political partisanship and intention to get vaccinated against COVID-19 when possible (“No”, “Maybe”, “Yes”, “Already received the vaccine”).

### 2.3. Procedure

Participants were randomly assigned to one of the two sets of statements (A or B), which were separated into different experiments on Prolific. Except for the “believing in nothing and believing in everything” scale, all measurements were identical for all participants, presented in the same order as described above. Finally, participants were debriefed on the purpose of the study, during which we clarified that they were exposed to both true and false information. We explained a few specific items and offered general tips for future critical examination of novel claims. (The full debrief is in the OSF repository.)

### 2.4. Data analysis

To examine our hypothesis regarding the difference in belief in mainstream and alternative claims between supporters and opponents of the vaccine, we calculated a mean score of belief in facts, belief in “alternative facts” and the mean difference between the two for each

participant (termed truth discernment). We conducted Welch Two-Sample *T*-Tests, since we cannot assume equal variances between the two preselected groups of participants. Furthermore, we compared between the groups on all additional scales.

## 3. Results

### 3.1. Truth discernment

We measured truth discernment as the difference between average belief in facts and in “alternative facts” for each participant. In support of our main hypothesis, we found that truth discernment differed significantly between the two groups. The vaccine-opposing group had a significantly lower truth discernment score than the pro-vaccine group ( $M_{\text{anti-vax}} = 2.71$ ,  $SD = 1.09$ ,  $M_{\text{pro-vax}} = 3.27$ ,  $SD = 0.92$ ,  $t(354.92) = -5.61$ ,  $p < 0.001$ ,  $d = 0.55$ ). Specifically, those who opposed the COVID-19 vaccine believed the “alternative facts” significantly more compared to those who supported the vaccine ( $M_{\text{anti-vax}} = 2.42$ ,  $SD = 0.89$ ,  $M_{\text{pro-vax}} = 1.98$ ,  $SD = 0.66$ ,  $t(323.24) = 5.52$ ,  $p < 0.001$ ,  $d = 0.56$ ), and vice versa; those opposing the COVID-19 vaccine believed the facts significantly less than vaccine supporters did ( $M_{\text{anti-vax}} = 5.13$ ,  $SD = 0.58$ ,  $M_{\text{pro-vax}} = 5.26$ ,  $SD = 0.54$ ,  $t(376.1) = -2.28$ ,  $p = 0.023$ ,  $d = 0.231$ ) ([Fig. 1](#)).

There were also significant differences between the two groups on the other scales: Reliance on Intuition ( $t(392.46) = 9.08$ ,  $p < 0.001$ ,  $d = 0.9$ ), Distrust ( $t(394.1) = 4.43$ ,  $p < 0.001$ ,  $d = 0.43$ ), Need for Chaos ( $t(382.74) = 3.34$ ,  $p < 0.001$ ,  $d = 0.33$ ) and General Conspiracist Beliefs ( $t(387.57) = 14.14$ ,  $p < 0.001$ ,  $d = 1.39$ ). The groups differed also in intellectual humility: significantly on Leary's scale ( $t(339.33) = -2.94$ ,  $p = 0.003$ ,  $d = 0.28$ ) and marginally on Alfano's scale ( $t(337.88) = -1.82$ ,  $p = 0.06$ ,  $d = 0.17$ ) ([Fig. 2](#)).

### 3.2. Correlations

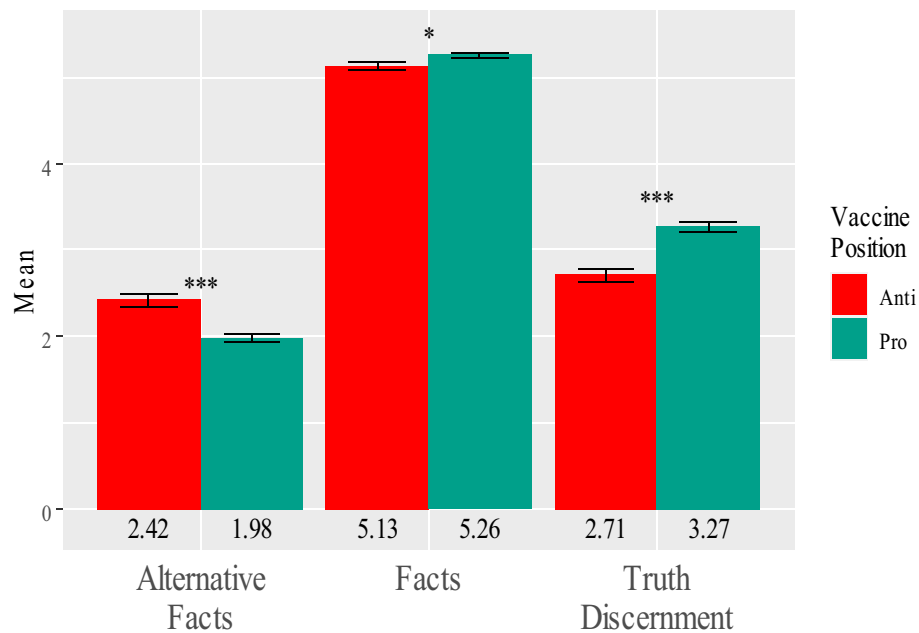
In line with our hypothesis, we found that lesser truth discernment was positively correlated with distrust, need for chaos and conspiracist beliefs; and the less participants distinguished between the facts and “alternative facts”, the more they relied on intuition. Finally, intellectual humility was positively correlated with truth discernment: the more intellectually humble a participant was, the more they differentiated between facts and “alternative facts” ([Table 1](#)). Further analyses are available in the OSF repository.

## 4. Discussion

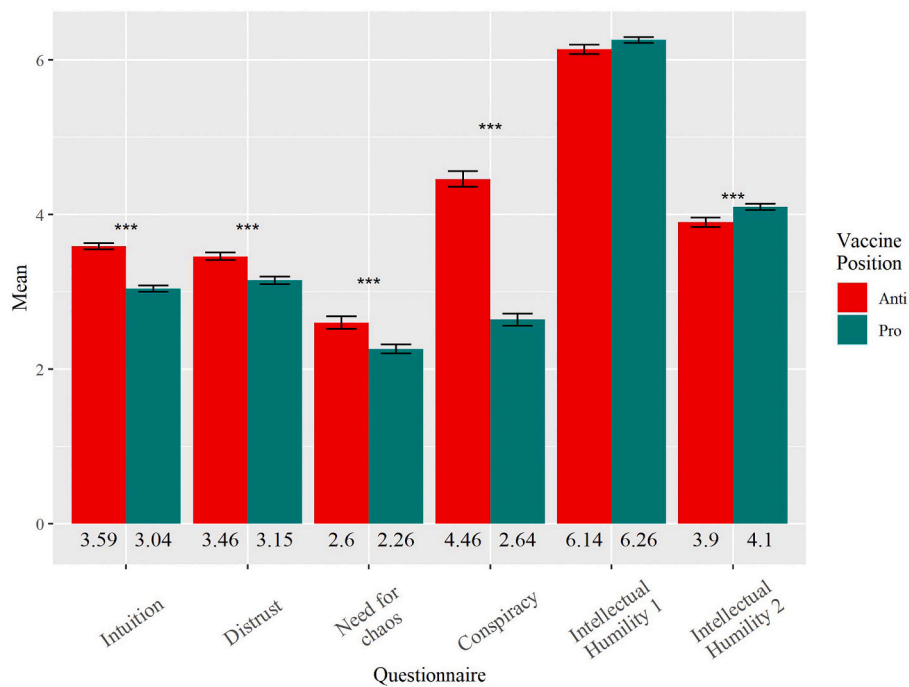
Our study examined the cognitive basis for the seemingly widespread paradox of adopting “alternative facts” and concurrently rejecting mainstream knowledge. To do so, we created the “believing in nothing and believing in everything” scale that measures belief in well-established facts and in novel claims of “alternative facts”. Our main hypothesis is that the cognitive paradox captured in our scale is a manifestation of a distrusting mindset, in which one spontaneously considers alternatives ([Mayo, 2015](#)). In line with this conceptualization, we found significantly less truth discernment among individuals with chronically high distrust – operationalized as participants opposing the COVID-19 vaccine – compared to a more trusting group, supporters of the COVID-19 vaccine. Specifically, the participants who rejected this vaccine believed mainstream facts less compared to those who supported the vaccine, and believed the novel “alternative facts” more. Critically, the results do not imply that vaccine opponents did not believe the facts at all; they did, but to a significantly lesser extent than supporters of the vaccine. Similarly, vaccine opponents did not find the “alternative facts” to be as plausible as the facts, but they believed them significantly more than the vaccine supporters did. The large effect size for belief in “alternative facts” suggests that the main effect of the distrust mindset is the consideration of alternatives, despite them being merely that – an alternative interpretation to a well-known fact,

<sup>2</sup> Cronbach's  $\alpha$  reported as measured in our study.

<sup>3</sup> After collecting the data, we realized that this measurement simply confirms participants' self-reported vaccine attitude.



**Fig. 1.** Mean scores and STE for the “believing in nothing and believing in everything” scale by vaccine attitudes. \* Indicates  $p < 0.05$ . \*\* indicates  $p < 0.01$ . \*\*\* indicates  $p < 0.001$ .



**Fig. 2.** Mean scores and STE for all scales by vaccine attitude. \* Indicates  $p < 0.05$ . \*\* indicates  $p < 0.01$ . \*\*\* indicates  $p < 0.001$ .

unrelated to COVID-19 or other issues that might elicit an identity-protective response. Given that the scale includes noncontroversial issues, we suggest that the scope of the “believing in nothing and believing in everything” paradox is greater when encompassing personal inclinations and cognitive biases that evoke identity-protective responses, such as political issues or known conspiracy theories.

Many current studies explore different factors that might lead people to believe COVID-19 misinformation (Pennycook et al., 2020; Soveri et al., 2021). We offer a general cognitive explanation that goes beyond specific content, highlighting a cognitive tendency to generally believe

facts less and “alternative facts” more. Critically, the “believing in nothing and believing in everything” paradox suggests that believing “alternative facts” is not a result of a general acceptance bias (Gilbert et al., 1993) but rather is due to another factor – an attraction to alternatives to a mainstream claim. Thus, the paradox may explain how non-political issues become political simply because they represent alternatives in a distrust context. People who exhibited the paradox were not only more distrusting in general, they also relied more on their intuition, believed conspiracy theories more, had a greater need for chaos and were less intellectually humble. This cluster of attitudes may provide the

**Table 1**  
Means, standard deviations and correlations for all scales across both groups.

Variable	M	SD	1	2	3	4	5	6
1. Truth discernment	3.03	1.03						
2. Mean intuition	3.28	0.66	-0.23**					
3. Mean distrust	3.29	0.72	-0.16**	0.06				
4. Mean need for chaos	2.41	1.02	-0.19**	0.19**	0.29**			
5. Mean conspiracy	3.43	1.58	-0.33**	0.38**	0.37**	0.51**		
6. Mean IH Leary	4.02	0.70	0.13**	-0.20**	0.01*	-0.02***	-0.03	
7. Mean IH Alfano	6.21	0.70	0.33**	-0.15**	-0.17**	-0.40**	-0.24**	0.49**

\* Indicates  $p < 0.05$ .  
\*\* Indicates  $p < 0.01$ .  
\*\*\* Indicates  $p < 0.001$ .

antecedents for belief in “alternative facts” and conspiracy theories. Future research could utilize the “believing in nothing and believing in everything” scale in various cultural contexts and in relation to different facts of a shared reality. It might be insightful to use the scale to explore societal contributors to the increased acceptance of information that contradicts facts of a socially shared reality. Examining times that may differ in general levels of trust, such as before/after elections, could be another productive direction. This line of research may offer a causal connection between dis/trust and alternative thinking that is absent in the current study. Finally, while recent studies suggest the role of intellectual humility in combatting misinformation (Koetke et al., 2021), this study implies that it is not enough to be less certain of one's own knowledge – critically, one must also trust others – advocating for the vital role of trust as a path to restoring the shared reality we all depend on.

**CRedit authorship contribution statement**

**Devora Newman:** Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft. **Stephan Lewandowsky:**

Conceptualization, Methodology, Writing – review & editing, Supervision. **Ruth Mayo:** Conceptualization, Methodology, Writing – original draft, Supervision.

**Declaration of competing interest**

The authors declare no competing interests.

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**Appendix A**

**Appendix 1**

All mean and SD scores for both sets of the “believing in nothing and believing in everything” scale by vaccine attitude.

Topic	Veracity	Prolific vax attitude	Mean	SD	Complete statement	Set
Animals	FALSE	Pro-vax	2.69	1.62	All animals can adapt to the changing environment.	B
	FALSE	Anti-vax	3.05	1.61		
	TRUE	Pro-vax	4.74	1.31	Animals are going extinct all the time.	A
	TRUE	Anti-vax	4.45	1.36		
Apples	FALSE	Pro-vax	1.89	1.02	All apples in the grocery stores are clones of each other, flavored and colored differently to increase sales.	A
	FALSE	Anti-vax	2.05	1.36		
	TRUE	Pro-vax	5.68	0.58	There are many types of apples that vary by flavor, color and genetic makeup.	B
Desalination	TRUE	Anti-vax	5.67	0.60		
	FALSE	Pro-vax	2.59	1.39	Desalinated water is recycled sewage water renamed in order to not deter people from using it.	B
	FALSE	Anti-vax	2.67	1.36		
Earth	TRUE	Pro-vax	4.96	1.17	Desalinated water results from the process of removing salt from seawater.	A
	TRUE	Anti-vax	4.96	1.19		
	FALSE	Pro-vax	1.83	1.35	Earth can change its rotation direction and can flip its axis, and we will never notice it.	B
Fossil fuels	FALSE	Anti-vax	2.08	1.47		
	TRUE	Pro-vax	5.75	0.72	Earth rotates eastward around its own axis, completing a full rotation once in about 24 h.	A
	TRUE	Anti-vax	5.40	1.23		
Gold	FALSE	Pro-vax	1.74	1.11	Fossil fuels cannot run out, as they can regenerate naturally.	A
	FALSE	Anti-vax	2.62	1.49		
	TRUE	Pro-vax	5.52	0.81	Reserves of fossil fuels deplete the more prevalently they are used.	B
News	TRUE	Anti-vax	5.05	1.13		
	FALSE	Pro-vax	2.89	1.16	There is an abundance of gold, being deliberately withheld.	A
	FALSE	Anti-vax	3.31	1.40		
	TRUE	Pro-vax	5.53	0.84	Gold is a limited resource mined from the earth.	B
	TRUE	Anti-vax	5.41	0.81		
	FALSE	Pro-vax	2.03	1.14	News channels report mostly bad news to drive up antidepressant sales.	A
	FALSE	Anti-vax	3.01	1.55		
	TRUE	Pro-vax	4.47	1.36	We are drawn to negative news, which is why it seems that that's all that is being reported.	B
	TRUE	Anti-vax	4.65	1.35		

(continued on next page)

## Appendix 1 (continued)

Topic	Veracity	Prolific vax attitude	Mean	SD	Complete statement	Set
Smoking	FALSE	Pro-vax	1.14	0.40	Smoking can be beneficial to your health.	B
	FALSE	Anti-vax	1.27	0.70		
	TRUE	Pro-vax	5.91	0.41	Smoking is harmful for one's health.	A
Stocks	TRUE	Anti-vax	5.87	0.40		
	FALSE	Pro-vax	2.21	1.02	All "Crashes" of the stock market are planned in advance in order to lower stock prices.	A
	FALSE	Anti-vax	3.05	1.34		
Women	TRUE	Pro-vax	5.00	1.12	A planned stock market crash is a felony.	B
	TRUE	Anti-vax	4.86	1.45		
	FALSE	Pro-vax	1.13	0.59	Women always had the right to vote; they abstained from doing so for diverse reasons.	B
	FALSE	Anti-vax	1.38	0.97		
	TRUE	Pro-vax	5.03	1.16	The 19th Amendment to the U.S. Constitution granted women the right to vote following widespread protests.	A
	TRUE	Anti-vax	4.95	1.18		

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