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ARTICLE

A feeling for the facts: intuitive epistemic identity predicts a non-consensus interpretation of a misleading clean energy meme

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Abstract

The purpose of this study is to show how intuitive epistemic beliefs and intuitive epistemic social identity contribute to misperceptions about science. Using a misleading clean energy meme for context, online survey results (U.S. only, N = 192) show that intuitive epistemic beliefs are negatively associated with interpreting the meme in a way that aligns with scientific consensus. This study also shows that social identity contributes to the misinterpretation. Results affirm the importance of science communication that resonates with people who trust their intuition.

Keywords

Public perception of science and technology; Public understanding of science and technology; Science and media

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Science is, if imperfectly, a process based in using empirical methods to gather facts about the world. However, some individuals maintain that the veracity of facts can be ascertained through an intuitive process, based on what "feels right" rather than what can be empirically verified. Intuitive thinkers pose a challenge to communicating science: for instance, a series of U.S.-based surveys found that 30% of intuitive thinkers agree that scientific facts are not useful for answering important questions [Oliver & Wood, 2018] and that intuitive thinkers are likelier to believe that "'unobservable forces' offer better explanations than 'empirical accounts'" [Oliver & Wood, 2018, p. 52]. At the same time, while scientifically accurate information is readily available about topics like climate change, individuals and organizations actively support the production and spread of information that is designed to counter the scientific consensus on climate change [Treen et al., 2020] and inaccurate information can spread widely. For example, inaccurate information about Hurricane Harvey, a major U.S. hurricane thought to be exacerbated by a changing climate [van Oldenborgh et al., 2017], was shared more often than news [King & Wang, 2023]. Further, decisions about factual validity are embedded in social situations [Garrett et al., 2020], meaning that individuals look to those around them for cues about what to believe. Together, intuition, inaccurate information about science, and social embeddedness create a scenario where intuitive thinkers could be especially vulnerable to believing information that does not align with scientific consensus.

Drawing upon theory in science communication, dual-process theories of information processing, and social identity, this study provides insight into how intuitive epistemic beliefs and epistemic social identity contribute to misperceptions about science. Specifically, this study focuses on epistemic beliefs that privilege intuition over evidence ("intuitive epistemic beliefs"). Epistemic beliefs concern "beliefs about the nature of knowledge and how one comes to know" [Garrett & Weeks, 2017, p. 1]. To provide a context for testing, this study uses a clean energy meme (described below and shown in the supplementary materials) that suggests, on its surface, that fossil fuels are less destructive to the environment than lithium mining for batteries. Though mining for materials that are needed for renewable energy storage has environmental hazards, the consensus is that fossil fuels are the main cause of anthropogenic climate change. In conjunction with intuitive epistemic beliefs, this study also explores how science knowledge, social media use, conservative news media use, and social identity contribute to the response to the meme.

Using data collected online in October of 2023 (U.S. only, n = 192), results show that intuitive epistemic thinking is negatively associated with science knowledge, and it is also negatively associated with choosing a response to the meme that aligns with scientific consensus. Further, intuitive epistemic beliefs interact with social identity ("epistemic social identity"), suggesting the effect of intuitive epistemic beliefs depend on epistemic social identity, at least at higher levels. Collectively, results provide evidence that scholars should consider intuitive epistemic thinking and epistemic identity as contributors to misperceptions about science.

1 ▪ Context

1.1 ▪ *Information processing and epistemic beliefs*

Epistemic beliefs are situated within dual-process theories of information processing [Garrett & Weeks, 2017; Oliver & Wood, 2018; Sloman, 1996]. Scholars who study dual-process

theories of information processing use different approaches, but a robust body of research shows that people process information in one of two ways: one way is automatic and fast, and the other is effortful and slow. For example, the elaboration likelihood model (ELM) holds that information is processed heuristically, using mental shortcuts, or systematically, which is more thoughtful and deliberative [Cacioppo et al., 1986]. Epistemic beliefs are similar: intuitive epistemic information processing is heuristic, meaning it makes use of mental shortcuts. It is automatic, and fast. On the other hand, its counterpart, evidence-driven information processing, is systematic, effortful, and slower [Garrett & Weeks, 2017]. While people do not process information one way or the other all the time, some tend to rely on facts and others tend to rely on feelings and intuition [Oliver & Wood, 2018]. For example, in one survey, 38% of intuitive thinkers agreed that "the heart is a better guide than the head" [Oliver & Wood, 2018, p. 61].

Whether information processing is heuristic or systematic depends on ability and motivation [Cacioppo & Petty, 1984]. Heuristic thinking is common, as people tend to be cognitive misers, using the minimal amount of information possible to arrive at a decision [Kahneman, 2011]. Despite people's tendency to be cognitive misers, heuristics, or mental shortcuts, are necessary to make sense of complex topics where people lack ability to systematically analyze information, such as cases where the science is only understood by experts. For example, trust is a heuristic, in that people must turn to others to guide them in circumstances where they lack ability and/or motivation to collect and analyze relevant information. For example, a recent study in Germany showed that higher levels of trust in scientists were associated with seeking information from high-quality scientific sources during the COVID-19 pandemic [Zimmermann et al., 2024]. Political party preference is another heuristic, in that parties provide cues, if not always facts, about what to believe or feel about various topics, including science and technology. For example, party identification predicts perceptions of nanotechnology [Brossard et al., 2009; Kim et al., 2014; Macoubrie, 2006] and genetic technologies [Howell et al., 2022]. Further, party identification is associated with perceptions of climate change, in that conservative political preferences are associated with skepticism toward it [Hart & Nisbet, 2012; Hornsey et al., 2016; Linde, 2018; Mayer & Smith, 2023]. Thus, though processing varies by person and circumstance, nonexperts may need to rely on heuristic or intuitive thinking when encountering information about science.

While self-reported measures are helpful in showing the challenges of communicating complex science with intuitive thinkers, behavioral measures also demonstrate the challenge, as heuristic thinking is associated with lower ability to withhold quick judgement. For example, the cognitive reflection test (CRT) presents people with intuitive, yet incorrect, answers to logic questions. One of the questions in the CRT concerns the amount of dirt in a 3' by 3' by 3' hole (correct answer: none) [Frederick, 2005]. To answer correctly, the ability to withhold the intuitive response is needed. A Turkish study showed that faith in intuition negatively correlates with performance on the CRT [Alper et al., 2021]. In practice, individuals who are more reflective are more selective in terms of who they follow and which posts they like on social media [Mosleh et al., 2021].

In contrast to heuristic or intuitive thinking, some people have the motivation to override their intuitive thoughts even when information or evidence contradicts current beliefs. One possibility is that some people take effort to examine their prior beliefs, a tendency called actively open-minded thinking (AOT) [Stanovich & West, 1997]. AOT is associated with

seeking information in an effort to improve a decision [Haran et al., 2013], and a study from Canada shows that intuitive epistemic thinking negatively correlates with AOT [Rizeq et al., 2021]. Further, people with higher levels of AOT believe that humans are causing climate change [Stenhouse et al., 2018] and a study in the Croatian context shows that they hold fewer misbeliefs about COVID-19 [Erceg et al., 2022]. In these cases, higher levels of effortful thinking were positively associated with agreement with scientific consensus.

1.2 ▪ *Media and intuitive thinkers*

Regardless of how people process information, they are likely to encounter science information through media channels: while only 7% of Americans have collected data for a science research project [National Science Foundation, 2022], over half of Americans encounter science information through mainstream news outlets [Funk et al., 2017], and of social media users, almost half claim to have seen science information recently [Saks & Tyson, 2022]. While the presentation may differ by medium, information is often encountered in brief moments, such as short news stories or social media reels.

Intuitive thinkers are sensitive to information they encounter. For instance, a study in Germany showed the effect of showing anti-vaccination content on intention to immunize was stronger at higher levels of preference for intuition [Betsch et al., 2010]. Similarly, after brief exposure to information about the risks of vaccine side effects, faith in intuition was associated with higher levels of risk perception concerning vaccinations [Schindler et al., 2021]. For intuitive thinkers, exposure to information about risks could create unease and possibly result in higher perceptions of risk despite overwhelming evidence.

A problem is that some sources are likelier than others to include information that does not align with scientific evidence such as conservative news media in the U.S. and social media. So, when people encounter science information, it may or may not reflect scientific consensus, and the extent to which consensus information is present depends on the source.

Though no outlets are perfect in their reporting of facts, U.S.-based, conservative-leaning Fox News is dismissive toward climate change [Feldman et al., 2012], whereas a sizeable majority of American Association for the Advancement of Science (AAAS) members believe humans are causing it [Funk & Rainie, 2015]. A study of 53 Fox News videos showed there were no positive mentions of the Green New Deal, a policy meant to encourage renewable energy production in the U.S. [Bhatti et al., 2022]. Experts say that renewable energy production is an important component of meeting energy needs while addressing climate change [Attanayake et al., 2024]. Also, false information about COVID-19 was spread through U.S. conservative news [Motta et al., 2020; Zhang et al., 2023]. U.S. conservative news use is associated with beliefs in inaccurate or non-consensus information over a range of topics, including politics [Garrett et al., 2016], climate change [Saldaña et al., 2021], and COVID-19 stay at home orders [Ash et al., 2024; Simonov et al., 2022].

Further, conservative news is popular: when Americans were asked to name their primary source of news, conservative-leaning Fox News was most often specifically mentioned, with 13% of Americans naming it as their primary source of news (for comparison, 10% of Americans named mainstream outlet CNN) [St. Aubin, 2024].

Given that conservative news contains information that is counter to scientific consensus, it should make it less likely that its users would interpret the clean-energy meme in a way that aligns with scientific consensus. Thus:

H1: Conservative news use will be negatively associated with choosing the consensus interpretation of the meme.

Next, social media is an important source of information on scientific issues [van Dijck & Alinejad, 2020], including climate change [Lima et al., 2024]. However, information on social media is not always scientifically sound, as it includes false and misleading information about it [Treen et al., 2020]. Further, social media influencers do not always share accurate information about scientific topics [Pfender & Devlin, 2023]. Besides its content, a multi-country study showed that social media use predicts beliefs about vaccines, genetically modified foods, and alternative medicine, and these beliefs are not always aligned with scientific consensus [Wu et al., 2023]. On the other hand, there is debate about the presence and impact of echo chambers online [Terren & Borge-Bravo, 2021] as users may encounter experts on social media who provide direct, timely, evidence-based science information [Malecki et al., 2021].

A majority of Americans use social media [Gottfried, 2024]. Given that social media users may encounter scientific information that is both accurate and inaccurate, social media use could contribute to either interpretation of the meme. Thus:

RQ1: How will social media use be associated with meme interpretation?

1.3 ▪ *Science knowledge*

A large body of research has debunked the idea that a deficit of knowledge is to blame for disagreement with scientific findings. These critiques of the "deficit model" refute the assumption that if citizens merely knew the facts about scientific topics, they would come to agreement with scientists [Grant, 2023]. However, science knowledge contributes to how people view scientific issues, for instance, as higher levels of science knowledge are associated with positive views toward science and technology in the U.S. and the U.K. [Allum et al., 2014; Ho et al., 2008; Rose et al., 2019] even though it varies depending on the issue [Drummond & Fischhoff, 2017]. Knowledge is a key component of the ability to discern fake science news from real, such as the ability to discern fake COVID-19 news [Calvillo et al., 2020]. Notably, a study done in the U.S. and U.K. context showed that there was no relationship between belief in one's capacity to use intuition and the correct determination of answers to questions [Leach & Weick, 2018]. For these reasons, understanding the science knowledge level of people who hold intuitive epistemic beliefs helps predict their views of science.

There is some evidence regarding the science knowledge levels of intuitive thinkers. For example, they are more likely to believe that gluten-free foods are healthier than foods that have gluten (which is not the case) [Oliver & Wood, 2018]. Further, intuitive thinkers tend to have lower levels of education [Oliver & Wood, 2018], and lower levels of education associate with lower levels of science knowledge [Kennedy & Hefferon, 2019]. Thus, intuitive thinking should be associated with lower levels of science knowledge.

H2: Intuitive epistemic beliefs will be negatively correlated to science knowledge.

Further, based on the evidence above, intuitive epistemic beliefs have similarities with fast, automatic information processing, and individuals who tend to rely on intuitive thinking are likely to have low levels of science knowledge. Thus:

H3: Intuitive epistemic beliefs will be negatively associated with choosing the consensus interpretation of the meme.

1.4 ▪ *Intuitive epistemic social identity*

Recently there has been increased attention to identity as a predictor of attitudes and behavior, including situations that concern controversial science. For example, having a highly religious and/or conservative party identity is associated with misbeliefs about gene editing, mining, and biofuel [Lyons, 2018], as well as less positive attitudes toward vaccination [Schindler et al., 2021]. In fact, holding anti-vaccination attitudes has become an identity itself [Motta et al., 2023]. Further, the way people approach information can be part of their identity. For example, intellectual identity concerns the extent to which people are curious and how they solve problems; intellectual identity can be attached to terms such as "intellectual" or "nonintellectual" [Barker et al., 2022]. Given evidence for intellectual identity, one's epistemic beliefs about facts could also constitute an identity.

However, less is known about whether epistemic beliefs are a group, or social, identity. To be in a social group, one must have awareness of being in a group, an evaluation of the group, and an emotional attachment [Tajfel, 1982]. Importantly, social identities shape behavior, as people will deny obvious facts when they compromise an important identity [Schaffner & Luks, 2018] and they will spread misinformation concerning politically polarized issues to protect in-group status [Zhu & Pechmann, 2025]. People do not want to be on the outside of a preferred group and will change perceptions to remain in it [Garrett et al., 2020].

Social identity, then, could be an aid but also a challenge to science communication, as identity reinforces beliefs, both consensus and non-consensus.

Thus:

RQ2: To what extent do intuitive epistemic beliefs comprise a epistemic social identity?

Further, an epistemic social identity could moderate the relationship of epistemic beliefs and meme interpretation:

H4: The interaction of intuitive epistemic beliefs and epistemic identity will be negatively associated with choosing the consensus interpretation of the meme.

2 ▪ Methods

2.1 ▪ *Stimulus*

The stimulus was adapted from a meme that circulated on Facebook in 2021 about a mine [Reuters Fact Check, 2021]. The meme includes aspects that could complicate interpretation for intuitive thinkers because arriving at the consensus-aligned result requires ability (such as possessing science knowledge) and withholding quick judgement.

The primary difference between the meme that circulated online and the meme in this study is that the mine shown in the study is a lithium mine (the original meme featured a copper mine, but there are many variations). At first glance it appears that the mine for clean energy is worse for the environment than fossil fuels are, as the fossil fuel component of the meme shows lush forest while the lithium mine shows brown, scarred earth; together these images create the impression that fossil fuels are less harmful than mining to support renewable energies.

2.2 ▪ *Data collection*

The questionnaire received Institutional Review Board approval, and data were collected through Prolific, a company that provides respondents for surveys. Prolific permits researchers to choose by country; "U.S. only" was selected, meaning that the platform would only offer the survey to respondents who were in their system as being in the U.S. There was also a screening question; if respondents indicated that they were in the U.S. they were allowed to continue, all others were sent to a screen that ended their participation (no participants chose other countries). Prolific provides the option to balance respondents by gender, and that option was selected given that certain important variables (e.g., intuitive thinking) correlate with gender [Oliver & Wood, 2018]. Given the topic of the study, this was a way to help ensure sufficient representation from people who hold intuitive epistemic beliefs. The questionnaire was fielded on October 21 and 22, 2023. The average time to completion was 9 minutes, 34 seconds, and respondents were paid $2.20 for their participation.

Power was determined with G*Power [Faul et al., 2007]. While the present study is exploratory in nature, the dataset was intended to support several studies. Because of this, the assumptions for the dataset were based on the requirements for OLS regression. Assumptions prior to data collection were as follows: a priori, linear multiple regression, effect size .10, power .95, ten predictors and six tested predictors. The result was a sample size of 185. Twelve respondents were rejected for failing to pass the attention check, leaving 192 respondents. The attention check was embedded in the intuitive epistemic social identity scale. There was also a factual manipulation check [Kane & Barabas, 2019] to be sure that respondents processed the image. This was comprised of a multiple-choice question where respondents were given three options to choose the topic of the meme (all but one passed). Race of the participants was as follows, with U.S. Census data [United States Census Bureau, 2024] in parentheses, for comparison: White, 77.1% (73.5%); Black, 11.5% (13.7%); Asian, 9.9% (6.4%); Native Hawaiian or Pacific Islander, .5% (.3%) or American Indian or Alaska Native 1% (2.3%); 4.2% preferred not to say.

2.3 ▪ *Analysis*

Independent variables in the model appear here in the order they were presented to respondents (not in the order in the model), with the dependent variable appearing after science knowledge but before media use. In cases where there were multiple response items in a scale, order was randomized to mitigate order effects.

Intuitive epistemic beliefs. Scale items were taken from Garrett and Weeks [2017]. Two scales from that study, faith in intuition for facts and the idea that truth is political, were combined to make the intuitive epistemology scale, which consisted of eight items, four from

each scale. Each item was measured from 1 (strongly disagree) to 7 (strongly agree). Example scale items included, respectively, "I trust my gut to tell me what's true and what's not" and "scientific conclusions are shaped by politics". Subsequently, the variable was created by taking the mean value of the eight items (scale M = 3.85 SD = .96, Cronbach's alpha = .79).

Social identity. Social identity was measured with a set of 12 items such as "My attitudes toward problems facing the nation today are similar to other people who share my knowledge beliefs", and "I like other people who share my knowledge beliefs." [adapted from Hogg et al., 1998]. Another item was "Regular people share my knowledge beliefs" and was based on items in two populism scales [Mede et al., 2021; Oliver & Rahn, 2016]; another measured the extent to which people might see their epistemic identity as distinct from others, "When talking about people who share my knowledge beliefs, I often use 'we' instead of 'they' [item adapted from Huddy et al., 2015]. Each item was measured from 1 (strongly disagree) to 7 (strongly agree). The variable was created by taking the mean value of the twelve items (M = 4.99 SD = .80, Cronbach's alpha = .89). The words "knowledge beliefs" were used rather than "epistemic beliefs" because of concern about participant understanding. The attention check item was embedded in this scale.

Intuitive epistemic social identity. Intuitive epistemic social identity was operationalized as an interaction term created by multiplying intuitive epistemic beliefs by social identity.

Science knowledge. Prior to answering a set of questions, respondents were asked to agree not to use external sources [a practice discussed in Clifford & Jerit, 2016]; all respondents answered yes. Given the context of the study, an earth science knowledge multiple choice battery was used [Kennedy & Hefferon, 2019]. Items included "Oil, natural gas and coal are examples of…" (correct response: fossil fuels), "What is the main cause of seasons on the Earth? (correct response: the tilt of the Earth's axis in relation to the sun), "When large areas of forest are removed so land can be converted for other uses, such as farming, which of the following occurs?" (correct response: increased erosion) and "An antacid relieves an overly acidic stomach because the main components of antacids are?" (correct response: bases). Answers were classified as correct or incorrect; the variable was created by adding up correct answers to create a count scale (scale M = 3.12 SD = .95).

Media use. Media use was measured as frequency of use of the following media, where 0 = never and 4 = everyday: media classified as conservative (examples: Fox News, The Drudge Report) (M = 2.08, SD = 1.19) and social media (examples: Facebook, TikTok, YouTube) (M = 2.93, SD = 1.42).

Controls. Demographic controls included age (M = 40.99, SD = 13.97), gender (48.6% male), and education (44.3% had "some college" or less). Party identification was measured with a single item: "In terms of political parties in the United States, would you say you are…" where 1 was Strong Democrat and 7 was Strong Republican (M = 3.25 SD = 1.55).

2.4 ▪ *Dependent variable: choosing the consensus interpretation of the meme*

Respondents were presented with an interpretation of the image ("Lithium mining for electric vehicles is worse for the environment than oil and gas") and then they indicated whether this was definitely true, true, false, or definitely false. The former two were coded as non-consensus and the latter two as consensus; 93 respondents chose the former.

Participants were not given the opportunity to answer, "don't know". While "don't know" is a legitimate response to questions where people do not have an answer, a criticism of "don't know" responses is that they do not collect information about a respondent's confidence in their answer [Graham, 2021]. To provide respondents with a way to express some doubt, confidence was captured by permitting respondents to express variation in their confidence of their answers.

Repeated exposure can increase the perception that false information is accurate [Pennycook et al., 2018], respondents were asked if they had seen the meme before; most had not (n = 183) or were not sure (n = 6) and three respondents claimed to have seen it previously. Given this low number, prior exposure was not included in the model.

3 ▪ Results

Tables 1 and 2 show the results of the analysis. The X^2 for the model is 47.71 ($p < .001$). As it concerns H1, Table 2 shows that conservative news use has a negative association with choosing the consensus answer to the meme. Thus, H1 is supported. Concerning RQ1, results show no significant relationship between social media use and meme interpretation.

Table 1. Zero-order correlations.

	Education	*Party ident.*	*Intuit.*	*Social ident.*	*Social media*	*Cons. media*
Party ident.	-.13***					
Intuitive	.07	.41***				
Social ident.	.09***	.02	.22			
Social media	-.05	-.04	.09	.06		
Cons. media	-.06***	.39***	.32**	.00	.09	
Ea. sci. know.	.19	-.11***	-.09***	.00	.01	-.07

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. Logistic regression analyses showing the likelihood providing a consensus response to the misleading clean-energy meme. N = 192.

	Odds ratio Exp(B)
Block 1: demographics	
Age	.97**
Gender (Male)	1.26
Education	1.09
Cox & Snell Pseudo R^2	.04
Block 2: Party identification	
Party identification	.66***
Cox & Snell Pseudo R^2	.12
Block 3: Epistemic beliefs	
Intuitive epistemic beliefs	.60**
Cox & Snell Pseudo R^2	.15

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	Odds ratio Exp(B)
Block 4: Social identity	
Social identity	1.58*
Cox & Snell Pseudo R^2	.17
Block 5: Media & knowledge	
Earth science knowledge	1.17
Social media	1.12
Conservative media	.71*
Cox & Snell Pseudo R^2	.20
Block 6: Intuitive epistemic social identity	
Intuitive*Epis identity	.57*
Cox & Snell Pseudo R^2	.22
df	8
X^2 (full model)	47.71***

Cell entries are the odds ratio. Degrees of freedom and X^2 are the final model only. * $p < .05$. ** $p < .01$. *** $p < .001$.

Next, H2 concerned the extent to which intuitive epistemic beliefs associated with science knowledge. There is a modest but significant correlation (-.09, $p < .001$), showing that intuitive epistemic beliefs have a negative association with earth science knowledge. Next, intuitive epistemic beliefs have a negative association with choosing the consensus answer to the meme. Thus, H3 is supported.

RQ2 concerned the extent to which epistemic beliefs are associated with a social identity. There is a nonsignificant correlation between intuitive epistemic beliefs and social identity (.22, ns).

Next, H4 concerned intuitive epistemic social identity and whether it would attenuate the relationship between intuitive epistemic beliefs and factual interpretation of the meme.

Figure 1 probes the interaction of intuitive epistemic beliefs and social identity. Data for this graph was created by PROCESS 4.0 [Hayes, 2017], as a Johnson-Neyman interval, which shows at what point a variable becomes significant. The Johnson-Neyman technique provides a nuanced view of the effect of focal predictors, as it identifies regions of significance in interactions [Hayes & Matthes, 2009]. In this case, epistemic group identity (the focal predictor) transitions to significance at 4.75 where it reaches .05. Thus, when group identity reaches 4.75, the odds of interpreting a misleading meme in a factual manner reach significance. In contrast, when epistemic group identity is less than 4.75, responses are not significantly different in terms of the effect of the meme. Thus, H4 is supported, but functionally, a high level of epistemic group identity is necessary before this factor makes a difference.

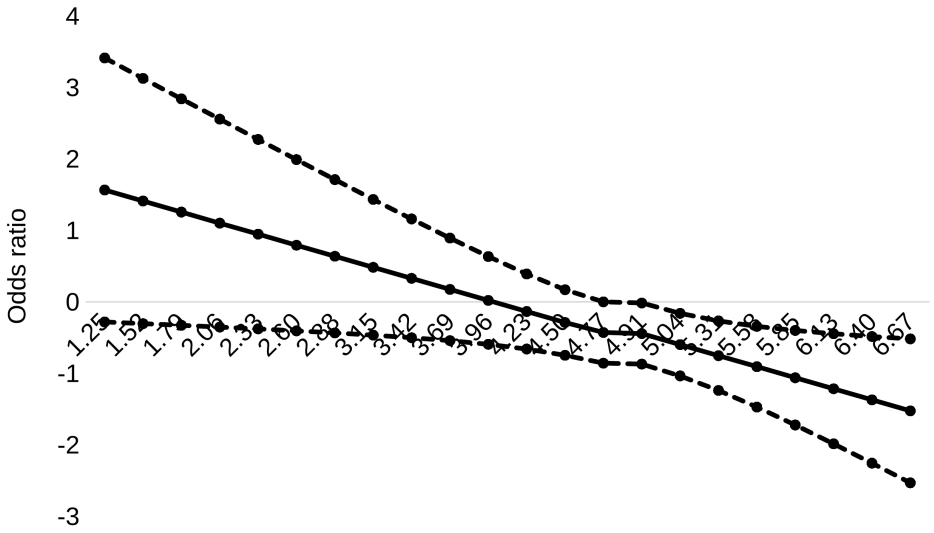

Figure 1. Effect of epistemic group identity at various levels on predicting a factual response to the meme (Johnson-Neyman). In this figure, the X axis is group identity. The Y axis is the odds ratio. The middle line is the predicted value of the odds of choosing the factual interpretation of the meme at various levels of intuitive epistemic social identity. The upper and lower lines are the 95% confidence interval of the odds of choosing the factual interpretation of the meme.

4 ▪ Discussion

Based on theory in information processing, social identity, and science communication, this study showed intuitive epistemic beliefs [Garrett & Weeks, 2017] are a contributor to misperceptions concerning scientific fact. This study advances both our understanding of intuitive epistemic beliefs and their implications for science communication. These results align with previous work that shows how intuitive information processing associates with a higher susceptibility to nonfactual information [Binnendyk & Pennycook, 2022; Garrett & Weeks, 2017; Rudloff & Appel, 2023; Young et al., 2022]. Further, this study showed that, at higher levels of intuitive epistemic identity, the possibility for misinterpreting nonfactual information is greater.

The current study makes several contributions. First, this study provides insight into factors relevant to science communication such as conservative news media and social media consumption in conjunction with intuitive epistemic beliefs. That social media use had no relationship to meme interpretation reflects the mixed nature of content [e.g. Malecki et al., 2021; Treen et al., 2020]. Further, aligned with previous research [Garrett et al., 2016; Motta et al., 2020; Saldaña et al., 2021; Zhang et al., 2023], this study showed that U.S. conservative news was associated with non-consensus meme interpretation. While it was out of scope for the present study to address this, future research should specifically address the extent to which non-consensus science information is found in conservative news, particularly in the U.S.

Next, this study shows that higher levels of intuitive epistemic beliefs are associated with lower levels of science knowledge, which aligns with other research from Western nations concerning intuitive information processing and science knowledge [Fuhrer & Cova, 2020; Oliver & Wood, 2018]. Further, that earth science knowledge was not associated with factual response to the misleading meme aligns with frequent critiques of the knowledge deficit

model of science communication [Simis et al., 2016]. However, looking at the small but significant relationship between intuitive epistemic beliefs and science knowledge, this research cannot rule out the fact that lack of knowledge could play some part in choosing a nonfactual answer, as results show that intuitive epistemic beliefs are associated with lower levels of science knowledge. Scholars should continue to explore the reasons behind why intuitive thinkers appear to have lower levels of science knowledge and what can be done to close knowledge gaps.

Moreover, another contribution of this study is that it affirms the importance of communication that can be easily and intuitively grasped. One unique aspect of this study concerns the nature of the meme in that it includes both facts and a falsehood, a potentially confusing situation. It also highlights the difficulty that the modern communication environment represents, as memes have been shown to be particularly adept at communicating contested issues [Heiskanen, 2017]. At the same time, memes feature cultural references and inside jokes [Park, 2020], which complicates understanding, as sufficient context is required for interpretation. In contrast, a study from Japan showed that consensus messaging, which focuses on the idea that scientists agree on a scientific issue, can be processed heuristically [Kobayashi, 2022], and a study in New Zealand showed that games that feature familiar ideas can increase the confidence of nonexperts in scientific discussions [Macknight et al., 2024]. Also, social media comments that point out errors in science denial memes are more understandable than analogies [Little & Sulik, 2025]. Thus, this study underscores the importance of accessible, high-quality science communication.

Next, this study provides evidence that intuitive epistemic social identity could have unique effects beyond intuitive epistemic beliefs on their own, at least at higher levels. Studies in the U.S. and the U.K. have shown that when individuals identify with groups, they tend to conform to norms [Abrams et al., 1990; Hogg & Reid, 2006; Zhu & Pechmann, 2025]. As it concerns interventions for reducing the effects of identity, there is evidence to suggest that identity-based interventions can work in some circumstances, such as reducing partisan animosity [Stanford University, 2022] while other evidence suggests that as it concerns facts, identity-based interventions are of limited use [Lyons, 2018].

The study is not without limitations. First, the stimulus represents a fraction of the kind of energy and climate content that can be found online. However, experimental designs do not need to mirror a real-world situation, rather, treatments should affect the independent variable in some way [Mutz, 2021]. Next, responses to memes can be multifaceted [Little & Sulik, 2025]; options in this study did not capture such nuance. Next, exposure to the meme in this study does not replicate how it would be encountered online, in a flow, alongside other content.

Also, this study has a small sample size, and is embedded in the context of Western science, which privileges Eurocentric ideas about how knowledge is built and what is epistemically acceptable. As the data were collected in the U.S., results apply only in that context. Further, the majority of studies referenced here were conducted in or on sample populations from majority English-speaking nations including the U.S., the U.K., Canada, or New Zealand, with the U.S. being most common. Nonetheless, intuitive thinking is likely present elsewhere, and future research could examine what the prevalence of intuitive thinking means in other national contexts. For example, in this data collection, intuitive thinking had a negative relationship to science knowledge. This may not hold true elsewhere.

5 ▪ Conclusion

It is not a stretch to see the challenges that intuitive epistemic beliefs and intuitive epistemic identities present for science communication and fact-based policies based on the best available evidence. Results give fresh urgency to the need to understand and develop better ways to communicate with people who hold intuitive epistemic beliefs and intuitive epistemic social identities.

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Data availability statement
Data and code are available upon request. Questions and the treatment used in this study are available here: https://osf.io/2e3bh/overview.

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