Psychological Review

How Beliefs Persist Amid Controversy: The Paths to Persistence Model

Kerem Oktar and Tania Lombrozo

Online First Publication, September 18, 2025. https://dx.doi.org/10.1037/rev0000583

AMERICAN PSYCHOLOGICAL ASSOCIATION

Psychological Review

ISSN: 0033-295X

https://doi.org/10.1037/rev0000583

How Beliefs Persist Amid Controversy: The Paths to Persistence Model

Kerem Oktar and Tania Lombrozo
Department of Psychology, Princeton University

On controversial issues from abortion to vaccination, we frequently know that millions disagree with us, yet remain firmly rooted in our beliefs. What enables this capacity to sustain controversial beliefs amid societal disagreement? To answer this question, we connect insights across the social sciences to develop the paths to persistence model (PPM). The PPM outlines four causes of persistence amid societal dissent: People may perceive disagreeing others as more ignorant, biased, or unintelligent than themselves or those who agree (*informational path*), consider the issue to be subjective or unknowable (*ontological path*), expect changing their beliefs to have bad social or personal consequences (*functional path*), or fail to deploy the cognitive resources to update their beliefs (*computational*). We explain how the PPM integrates previous theories across disciplines into interacting "paths" that jointly explain persistence. We then present a preregistered study with a sample quota-matched to the U.S. census on race and sex (N = 1,250) investigating responses to societal disagreement on 96 issues spanning science, politics, morality, and religion. We find that most participants persist in their beliefs amid controversy—even when they learn that they vastly underestimated the extent of societal dissent. Moreover, we find that the paths jointly predict whether people persist and are associated with important social outcomes, such as people's willingness to befriend disagreeing others. Four additional preregistered open- and close-ended studies (N = 1,921) support these findings and our theoretical model.

Keywords: disagreement, controversy, persistence, belief, judgment

Supplemental materials: https://doi.org/10.1037/rev0000583.supp

When, how, and why do people persist in their beliefs amid controversy? Why do not the dissenting opinions of millions give us pause about whether God exists, whether vaccinations should be mandated, or whether abortion is immoral? Why does controversy so rarely make us question or update our beliefs instead? Our aim in the current article is to address this puzzle of persistence: people's tendency to remain anchored to their beliefs amid large-scale disagreement.

Despite pertinent work in psychology (Minson et al., 2023), philosophy (Frances, 2014), political science (Iyengar et al., 2019), economics (Golman et al., 2016), linguistics (Angouri & Locher, 2012), and sociology (Wagner-Pacifici & Hall, 2012), recent reviews highlight major gaps in our understanding of disagreement and persistence. For instance, compared to other topics in philosophy, the study of disagreement is "a mere infant" that has focused almost exclusively on disagreement among peers (Frances & Matheson, 2019). In the sociological literature on large-scale opinion dynamics, "basic empirical questions about how to underpin model assumptions [e.g., about how individuals respond to evidence from disagreement] remain unanswered" (Flache et al., 2017, p. 19). Similarly, relevant work in political science rests on "a rather shaky foundation; there are legitimate differences of opinion—sometimes explicit, often implicit—about what disagreement is" (Klofstad et al., 2013, p. 132). Underlying this cross-disciplinary uncertainty is a dearth of communication: Studies of disagreement are highly siloed across disciplines, in part due to the absence of a model of persistence that can bridge across literatures.

Such gaps in our understanding of societal disagreement are especially worrying in light of persistent political, scientific, and moral divisions within the United States and in democracies across

Andrew Bayliss served as action editor.
Kerem Oktar https://orcid.org/0000-0002-0118-5065
Tania Lombrozo https://orcid.org/0000-0001-5637-1431
A summary of the framework as well as empirical data from the first two supplementary studies was presented at the 2022 meeting of the Cognitive Science Society and appear in the peer-reviewed conference proceedings. The framework was also presented at the 2022 meeting of the Society for Philosophy and Psychology, 2023 meeting of the Society for Personality and Social Psychology, and 2024 meeting of the Society for Judgment and Decision-Making. The authors are grateful to Ozlem Ayduk, Jay Van Bavel, Rahul Bhui, Molly Crockett, Fiery Cushman, Corey Cusimano, Simon DeDeo, Kevin Dorst, Russell Golman, Tom Griffiths, Mark Ho, Casey Lew-Williams, Julia Minson, David Rand, Federico Rossano, Eldar Shafir, Joseph Sommer, Thiago Varella, Natalia Vélez, Jamil Zaki, Kevin Zollman, and members of the Concepts and Cognition Lab for valuable feedback. All preregistrations, materials, data, and analysis scripts are available in the open-access repository at https://osf.io/389as. An earlier version of the article was shared as a preprint on PsyArXiv at https://osf.io/preprints/psyarxiv/9t6va_v1. The authors have no known conflicts of interest to disclose.

Kerem Oktar played a lead role in conceptualization, formal analysis, investigation, methodology, software, visualization, and writing–original draft and an equal role in writing–review and editing. Tania Lombrozo played a lead role in funding acquisition and supervision, a supporting role in conceptualization, formal analysis, investigation, methodology, and visualization, and an equal role in writing–review and editing.

Correspondence concerning this article should be addressed to Kerem Oktar, Department of Psychology, Princeton University, 40 Woodlands Way, Princeton, NJ 08540, United States. Email: oktar.research@gmail.com

the globe (Carothers & O'Donohue, 2019; Levitsky & Ziblatt, 2018). Severe societal disagreements carry drastic consequences for individuals, such as partisan discrimination (Iyengar & Westwood, 2015), and for states, such as a loss of trust in democratic institutions (Hetherington & Rudolph, 2015). Developing a principled understanding of persistence can facilitate the design of interventions aimed toward mitigating such harmful consequences.

Even this brief summary reveals that there is a lack of clarity and much at stake—practically, scientifically, and philosophically—when it comes to our understanding of the psychology of belief persistence amid societal disagreement. In this article, we present and test a model that furthers this understanding by distilling findings across disciplines into four explanations for persistence.

Overview

This article is structured in four parts. In Part 1, we define disagreement and situate persistence as one of several possible responses to it. We clarify how disagreement is both related to and distinct from other forms of contrary evidence, and we narrow the scope of our analysis to the drivers of persistence amid societal disagreement.

In Part 2, we present a taxonomy of drivers of persistence called the "paths to persistence model" (PPM). This model is comprised of four primary paths, each of which offers a conceptually distinct basis for persistence supported by prior research. We outline key points of convergence and divergence between the PPM and alternative explanations of persistence.

In Part 3, we test this model through a large-scale study. Across 96 contentious issues, we investigated whether people's responses to disagreement accord with the structure of the PPM, whether the PPM can predict persistence, and whether taking different paths to persistence is associated with important social outcomes, such as silencing dissent. We also outline several other studies that replicate and extend these findings using different measures, questions, and outcomes.

In Part 4, we discuss key theoretical, practical, and normative implications of our model—from the design of belief-change interventions to whether people should persist—and conclude with important open questions about the psychology of societal disagreement.

Part 1: Defining and Responding to Disagreement

What Is Disagreement?

Philosophers conceptualize disagreement as the state that obtains when two or more parties have different beliefs about a proposition (Frances, 2014). A characterization of disagreement thus depends on one's understanding of *belief*. While some consider beliefs to be mental representations, others consider beliefs to be dispositions to behave in consistent ways (Schwitzgebel, 2024); while some decompose beliefs into distinct attitudes (such as belief and disbelief), others consider beliefs to be graded representations of one's level of confidence in a claim (Wedgwood, 2012). Here, we take a representational and graded approach to belief, which allows us to connect disagreement with the extensive literature in cognitive science and beyond (Quilty-Dunn & Mandelbaum, 2018). In Bayesian epistemology, for instance, beliefs are conceptualized as subjective probability assignments called "credences." For a given individual, a belief in climate change could correspond to some credence—for instance, an 80% probability that climate change is real (Bovens & Hartmann, 2003).

The connection to Bayesian epistemology further allows us to formalize disagreement using probability theory, whereby discrepancies in people's credences (i.e., subjective probabilities) about the truth of a proposition can characterize how much they disagree. For example, we can define disagreement as a state in which two parties, A and B, do not hold the same credence regarding a proposition, S (i.e., $P_A(S) \neq P_B(S)$). Using another definition, disagreement can be any state where the difference between the two parties' credences exceeds some threshold, Δ (i.e., $|P_A(S) - P_B(S)| \geq \Delta$).

Precisely how differences in credence correspond to people's judgments of disagreement is an open empirical question (see Oktar, Byers, & Lombrozo, 2024). Thus, we define disagreement as divergence in credences, without committing to a particular measure of divergence. For instance, individuals who meaningfully differ in the probability they assign to the proposition that climate change is real can be said to disagree. Generalizing to group settings, large-scale disagreement can be defined in terms of divergence over the set of every agent's credences (Lackey, 2021).

Is Disagreement Simply a Form of Disconfirmatory Evidence?

Learning that another person disagrees provides a potential source of disconformity evidence. As such, persistence amid disagreement can be seen as an instance of a much more widespread tendency to dismiss or ignore contradictory evidence—a tendency studied across psychology under many guises, from confirmation bias (Nickerson, 1998) to closed-mindedness (Kruglanski, 2004), and from cognitive rigidity (Schultz & Searleman, 2002) to conservatism in updating (Peterson & Beach, 1967), among others (Hilbert, 2012; Kunda, 1990; Munro & Ditto, 1997; Stanovich et al., 2013; Zaller, 1992). Though it is part of this broad family of phenomena, persistence amid disagreement involves partially distinct psychological mechanisms. This is because disagreement offers what philosophers call *higher order* (i.e., indirect) evidence (Christensen, 2010; Kelly, 2010)—a fundamentally distinct kind of evidence from that typically studied in this literature.

Consider the following paradigmatic examples: Research on dissonance presents participants with essays containing counter-attitudinal facts and arguments (Bochner & Insko, 1966), research on conservatism presents participants with data statistically relevant to a hypothesis (Phillips & Edwards, 1966), and research on biased assimilation presents participants with studies that disconfirm the validity of their position (Lord et al., 1979). In each case, the evidence provided is *first-order* evidence, in that it bears directly on the truth of the proposition in question. By contrast, disagreement offers indirect ("higher order") reasons to question one's beliefs. For instance, an individual may infer that other people disagree because they have access to evidence that the individual themselves lacks or because they made an error in their own reasoning.

The following example clarifies how higher order evidence can influence beliefs. Suppose you try to mentally calculate 32×47 and find 429. After, you note that you are extremely fatigued and thus prone to mistakes. You should grow less confident in your answer, not because your fatigue offers evidence one way or the other concerning the product of 32 and 47, but because your fatigue renders the mental evidence you generated less reliable. Similarly,

disagreement provides an indirect reason to question a belief—by questioning whether it is reliably tracking the truth—rather than offering first-order evidence concerning the belief itself.

Since disagreement is a distinct kind of evidence, evaluating disagreement often involves psychological processes that differ from those studied under the banner of "disconformity evidence," and these processes are key drivers of persistence. We briefly describe three differences between these processes here, simply to make the point that existing explanations of resistance to disconfirmation do not provide a complete account of persistence in response to disagreement.

First, responding to disagreement involves distinct evaluations of reliability. Whereas evaluating first-order evidence (e.g., how diagnostic a medical test is of some illness) requires expertise in the subject matter, evaluating higher order evidence from disagreement requires judging the relative epistemic standing of disagreeing others, such as evaluating how diagnostic a physician's opinion is of some illness (Plunkett et al., 2020; Shanteau, 2015). Second, whereas evaluating multiple pieces of first-order evidence requires tracking contingencies across data points, evaluating dissent from multiple informants requires inferring the social and informational relationships between them, for which people utilize distinct cognitive strategies (Connor Desai et al., 2022; Son et al., 2021). Finally, whereas first-order disconfirmation often entails updating one's beliefs about the proposition at hand, higher order evidence from disagreement can call into question one's expertise in a domain or even one's overall capacity for reasoning, undermining self-trust. This is because first-order evidence provides direct evidence that one can use to update, whereas disagreement suggests that some part of the belief-generating process may be suspect, without specifying which. Evidence from disagreement can therefore be cognitively risky, as evident in cases of gaslighting or conservative responses to unfamiliar advisors (Soll & Larrick, 2009; Spear, 2023).

In brief, learning that other people's beliefs diverge from one's own offers higher order evidence that one may be wrong. Evaluating and responding to such evidence involves overlapping and distinct mechanisms from those involved in typical cases of disconfirmation.

How Can People Respond to Disagreement?

In principle, an individual can respond to disagreement in one of four ways: conciliation, suspension, persistence, and polarization. As illustrated in Figure 1, conciliation involves moving one's credences toward the disagreeing other; suspension involves withholding judgment on the issue[1]; persistence involves remaining steadfast in one's prior credences; and polarization involves moving one's credences away from the disagreeing other.

Psychologists have shown that people provide all four responses to disagreement in different cases. For instance, people optimally conciliate when learning about trivia from the aggregated opinions of a jury (Oktar, Lombrozo, & Griffiths, 2024), children suspend when peers disagree with their observations (Langenhoff et al., 2023) but persist in their beliefs when disagreeing with unreliable informants (Kominsky et al., 2016), and learning about dissent can cause polarization if dissent is assumed to be insincere or manufactured (Cook & Lewandowsky, 2016). Focusing on normative rather than descriptive claims about disagreement, philosophers argue that all four responses can be appropriate in different cases: some advocate for persistence (Kelly, 2005), others for conciliation (Christensen, 2007), and others for suspension (Feldman, 2007); recent work argues that polarization can be a rational response to some contradictory evidence as well (Dorst, 2023).

In sum, there are four possible responses to disagreement, all of which can be empirically observed and have been normatively defended under various circumstances. Thinking back to our starting examples, however, it seems as though societal disagreement often results in persistence—our beliefs seem resilient to dissent on whether God exists, vaccinations should be mandated, or abortion is immoral. In Part 3, we empirically show that this intuition is correct: Persistence is in fact the typical response to novel evidence of societal dissent concerning such issues. But why would this be the case? In the next section, we outline a model that clarifies persistence theoretically and thus grounds our later empirical investigation.

Part 2: The Paths to Persistence Model

In part, persistence is prevalent because there are many causes of persistence. The PPM distills these well-studied causes into a coherent framework for understanding persistence, in the spirit of other broad and fruitful frameworks such as the stereotype content model (Fiske et al., 2002) or the appraisal theory of empathy (Wondra & Ellsworth, 2015). Its key innovations are synthesis and parsimony: The PPM subsumes existing explanations of persistence across decades and disciplines into four comprehensive and intuitive factors, while clarifying how they relate to one another. These factors offer theoretically distinct (though potentially interacting) paths to persistence. The model's key value proposition is that it supports empirical generalizations and provides the language necessary to broaden and integrate siloed perspectives—exposing, for instance, the theoretical importance of interactions across paths (which we demonstrate in Part 3) and the practical importance of tailoring interventions to multiple paths in a case-specific manner (as we detail in the General Discussion). We briefly introduce each path and provide a rationale for the structure of the model before considering the paths in more detail.

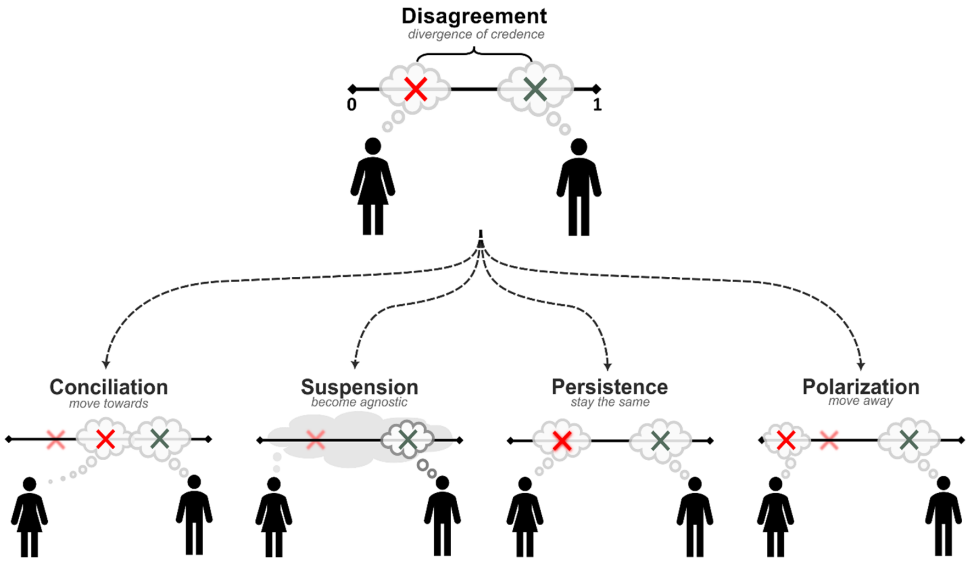
The *informational* path captures how belief persistence can result from considerations such as the quality of evidence or competence attributed to those who disagree. For instance, an individual might persist in their belief that the moon landing was staged despite disagreement if they believe that others are relying on sources that are less reliable than their own.

The *ontological* path captures how people can persist if they do not see an issue as having an underlying "truth" for people to converge on. For instance, an individual might persist in their belief that euthanasia is morally permissible because they regard this proposition as fundamentally subjective.

The *functional* path captures how beliefs can persist due to their personal or social value. For instance, a fervent supporter of a politician accused of crimes might not be swayed by disagreeing strangers because the belief is held out of loyalty or social pressures, rather than epistemic considerations.

[1] There are two common ways to view suspension of judgment from a probabilistic standpoint (Rosa, 2021). Suspension can be seen as middling credence (e.g., defaulting to .5 in the scale in Figure 1), or as an interval that represents one's uncertainty (e.g., indifference between any credence between 0 and 1 as a representation of one's belief state). We are not aware of any psychological research that distinguishes between these possibilities.

Figure 1
Four Possible Responses to Disagreement



Note. Responses to divergence shown through changes in the left figure's credences. See the online article for the color version of this figure.

Finally, the *computational* path captures the possibility that persistence may result from a failure to adequately process the implications of dissent. This failure may be intentional or unintentional: For instance, an antivaxxer might see a poll on the news that indicates societal dissent but switch to a different channel—choosing not to deploy cognitive resources—or focus on and still fail to draw reasonable conclusions about what that poll implies (see Figure 2).

In the rest of this section, we first illustrate the structure of the model, then describe the four intertwined paths individually. We describe how the content and structure of the PPM build on prior work in a later section (*The PPM Subsumes Alternative Models of Persistence*).

Figure 2
A Taxonomy of Four Paths to Persistence

Paths	Sub-paths	Examples
Informational *Are disagreeing others reliable informants?*	Evidence / Processing	*Sustaining the view that vaccines are safe by perceiving anti-vaxxers as uninformed or stupid.*
Ontological *Is there a truth to converge on?*	Subjectivity / Unknowability	*Discounting disagreement about euthanasia by considering it a fundamentally subjective issue.*
Functional *Would it hurt to change my view?*	Interpersonal / Intrapersonal	*Enduring in suporting a corrupt politician due to the costs of belief change, such as social exclusion.*
Computational *Do I have the cognitive resources to question?*	Representation / Reasoning	*Persisting in flat-Earth beliefs by failing to attend to evidence of societal dissent, such as a poll.*

Note. Each branch in the taxonomy represents a distinct explanation for belief persistence. Importantly, the paths are not mutually exclusive: A given instance of belief persistence can involve multiple paths acting simultaneously. See the online article for the color version of this figure.

The Structure of the Model

Before describing each path in more detail, including its relationship to prior work, we describe the theoretical structure underlying our model. This structure explains why we take the model to not just summarize past literature (in a bottom-up fashion) but to also form a comprehensive and principled taxonomy (in a top-down sense).

Theoretically, the first three paths align with *epistemic* (informational), *metaepistemic* (ontological), and *nonepistemic* (functional) reasons to persist. That informational considerations are epistemic is straightforward (as the information in question relates to the amount and quality of others' knowledge regarding issues). Ontological considerations (e.g., subjectivity) are metaepistemic, in the sense that they influence whether epistemic analyses are relevant to understanding an issue (for instance, subjectivity is a standard example of a metaepistemic consideration; Carter, 2018). And functional considerations are canonical examples of nonepistemic reasons for holding beliefs—as one epistemologist put it, "paradigmatic nonepistemic reasons, on the other hand, are reasons which bear on the achievement of a subject's nonepistemic (noncognitive, nontruth-related) goals [such as feeling good]" (Bondy, 2021, p. 1762).

These are all considerations that arise at a rational level of analysis (what Marr called the computational level; Marr, 1982), as they offer rational reasons to persist given a believer's goals and the nature of the issue in question. Importantly, epistemic, metaepistemic, and nonepistemic considerations exhaust this set of considerations. But at the algorithmic level, resource limitations can also play a role, and this is captured by our computational path. From this theoretical lens, the only class of causes of persistence that the model

potentially omits are those that arise from the implementation level and that are not reflected in algorithmic or rational considerations (such as neurological deficits—for instance, anterograde amnesia can cause persistence of belief in ways that are not captured by the PPM).

Our four factors can also be motivated in a principled manner from a Bayesian perspective. To illustrate, consider the core components of a recent Bayesian model of learning from aggregated opinion (such as public opinion polls; Oktar, Lombrozo, & Griffiths, 2024). This model predicts that people will persist (i.e., beliefs will not be updated) on some proposition Q if either (or both) of two conditions hold: People are maximally confident in their prior beliefs about Q, or they perceive societal opinion to be undiagnostic regarding the truth of Q.[2] Both of these conditions correspond to the informational path. Strong prior beliefs will serve as an informational consideration insofar as they support an epistemic asymmetry, with the learner's own prior beliefs weighed more heavily than those of others. Societal opinion will be viewed as undiagnostic when disagreeing others are perceived as being ignorant, stupid, or biased.

The remaining paths instead generate persistence by rejecting fundamental assumptions implicit in this simple Bayesian approach. The ontological (metaepistemic) path rejects the assumption that there is a shared truth—an objective matter of fact—for different individuals to converge to. The functional (nonepistemic) path rejects the assumption that beliefs aim (only) at truth—and hence that we should aim to update beliefs to maximize accuracy. And the computational path rejects the assumption that a believer has the resources needed to fully evaluate relevant considerations. In rejecting these assumptions, the PPM suggests that simple Bayesian analyses would overprescribe belief change in many contexts—for instance, when the intrapersonal functional benefits of a belief make sticking to one's priors instrumentally rational (Kolodny & Brunero, 2023).

Taken together, these theoretical and formal arguments illustrate why our model is not merely a summary of past research but instead provides a structure that comprehensively accounts for potential causes of persistence and with principled distinctions among paths. This structure also helps illuminate why we might expect useful empirical predictions and generalizations to arise from a consideration of these paths: They correspond to different rational considerations and formal assumptions. That said, we do not expect the paths to map on neatly to underlying psychological mechanisms (at the algorithmic level): Aspects of attention, memory, and reasoning are likely to play roles that cross-cut paths, and individual paths will correspond to more than one mechanism. In the sections that follow, we summarize prior research supporting the operation of each path and, where applicable, highlight promising advances related to underlying mechanisms.

The Informational Path to Persistence

Theo buys organic produce for his family because he believes that genetically modified foods are less healthy for human consumption. Theo is aware of the genetically modified organism (GMO) controversy and has spent time carefully researching it. He is not bothered by disagreement over this issue because he considers himself to be a smart, informed consumer, unlike those who disagree—they either do not care enough to seek the facts or are dumb enough to be misled by corporate lies.

Theo's case illustrates how epistemic explanations can sustain controversial beliefs. He is aware of the disagreement over GMOs (Pew Research Center, 2016), but thinks that disagreeing others are less reliable than he is at tracking scientific truths. He thus does not update his views based on their credences.

We organize our discussion of such epistemic explanations around judgments of others' *evidence* and *processing*. These components are correlated—a biased or incompetent person is likely to be poorly informed—but distinct. For instance, a climate change denier might believe that others are honest and competent but misinformed by mass media.

Informational Persistence: Judgments of Inferior Evidence

Research in social and developmental psychology has shown that people readily attribute evidential inferiority when evaluating disagreement. The literature on naïve realism (people's tendency to assume that their own perceptions reflect reality as it is) has documented that people often judge disagreeing others as ignorant (Robinson et al., 1995; Ross & Ward, 1996), with larger disagreements leading to judgments that others have correspondingly worse evidence (Pronin et al., 2004).[3]

Children also judge disagreeing individuals as uninformed and ignorant in some domains of disagreement, such as moral disagreements, but not cultural disagreements (Wainryb et al., 2001). Such judgments are not necessarily unfounded—selectivity in learning is a basic component of our social reasoning toolkit and undergirds epistemic vigilance (Harris et al., 2018; Koenig & Harris, 2005; Sperber et al., 2010). Accordingly, even young children consider informants' sources when deciding whom to believe (Aboody et al., 2022), and novices conciliate toward the opinions of trusted experts because they are thought to possess more (and better) evidence in their areas of expertise, rather than merely being influenced by their authority (Kruglanski et al., 2005).

Despite the abundance of evidence that disagreeing individuals are judged to possess inferior evidence, less is known about whether people make the same judgment about disagreeing *groups*. Note that attributing epistemic inferiority to a group requires taking a strong stance: that the disagreeing group, as a whole, has worse epistemic qualities (e.g., less supporting evidence) than oneself or than the group that shares one's own belief (see Oktar & Lombrozo, 2025, for a review of the distinctive challenges of drawing inferences from

[2] Specifically, the Bayesian model uses a sample of aggregated opinions, X, to infer the probability, θ, that the statement Q is true, $P(Q) = \theta$. The model combines prior beliefs about truth, $p(\theta)$, with a likelihood function that connects observations of binary opinions, X, to inferences about θ (denoted $P(X|\theta)$). When people are assumed to be reliable informants (e.g., $P(x_i = 1|\theta) = \theta$), the optimal inference (i.e., the posterior) combines prior beliefs with the information in the opinion distribution. There are two conditions under which beliefs will not be updated. First, if prior beliefs are extreme (that is, when people are certain that the belief is false ($p(\theta) = \lim_{\alpha \to \infty} \beta(\alpha, 1)$) or true ($p(\theta) = \lim_{\beta \to \infty} \beta(1, \beta)$). Second, if opinions are uninformative about the truth of Q (e.g., $P(x_i = 1|\theta) = .5$).

[3] We note that the vast majority of the empirical evidence in this article comes from studies conducted in the United States and should not be assumed to generalize to all people (Henrich et al., 2010). For the sake of conciseness and readability, we will use the term "people" when referring to the results of studies, but readers should keep in mind that additional research is needed to investigate whether mechanisms of persistence vary across populations.

group opinion). Research on lay epistemology suggests that people may indeed fall back on the epistemic qualities of their own group, as people rely on experts in their community to maintain the evidence, reasons, and understanding that undergirds their shared beliefs (Hardwig, 1985; Rabb et al., 2019).

One approach to justifying these attributions is through perceptions of source dependence. If all disagreeing others are perceived as receiving their information from the same source, for example, their informativeness would be reduced to that one source. Given that 87% of both Republicans and Democrats perceive each other to be "brainwashed" (Yudkin et al., 2019), that people consider others to be more easily persuaded by mass media than themselves (Duck & Mullin, 1995; Sun et al., 2008), and that outgroups are perceived to be highly homogenous (Quattrone & Jones, 1980; Rubin & Badea, 2012), judgments of dependency can plausibly justify attributions of inferior evidence to entire groups.

Informational Persistence: Judgments of Inferior Processing

People are sensitive to asymmetries in processing as well. For instance, children learn from their parents not just because adults have better evidence about the world, but also because adults are more competent—that is, more likely to make the right inference given the same evidence (Harris, 2012). Adults, on the other hand, persist on the basis of their greater knowledge and competence. We can break down judgments of inferior processing into two varieties: attributions of intellectual inferiority and attributions of bias.

Anecdotally, people often denigrate disagreeing groups, labeling them "childish, stupid people" or claiming that they are "ignorant, stupid, or insane" (quotes from opinion pieces on controversies; Cunningham, 2021; Dawkins, 1989). There is little work in psychology on such judgments of inferior intellect. As Hartman et al.'s (2022) point out in a recent article, "the only investigations … [of political attributions of] unintelligence were conducted by polling organizations" (Hartman et al., 2022, p. 1015). Their results show that these attributions are distinct from other negative judgments (e.g., immorality and dislike) and echo the findings of these polls: Political partisans in the United States are likely to view each other as unintelligent (a third agree with such attributions; Pew Research Center, 2019). Developmental studies suggest that children often make domain-dependent attributions of "unintelligence" in response to disagreement as well (Wainryb et al., 2004).

A much larger body of evidence in social psychology has shown that people consider disagreeing others to be more biased (Kennedy & Pronin, 2008), driven by self-interest (Reeder et al., 2005), unfair (Frantz, 2006), and influenced by group pressures (Cohen, 2003) than themselves. While these uncharitable judgments are not identical, they function similarly in the context of disagreement: If an informant is perceived to be biased or deceptive, their beliefs should rationally carry less epistemic weight (Oktar, Sumers, & Griffiths, 2024).

Mechanisms of Informational Persistence

Although the PPM is not a process model, we offer examples of how the judgments relevant to each path might arise. For the informational path, computational models of social learning outline rational mechanisms that can generate persistence on the basis of epistemic considerations. Shafto et al. (2012), for instance, suggested that learners can employ Bayesian inference to jointly reason about the truth of a proposition and the informational quality of their informants on the basis of informants' expressed beliefs. This requires recursive social inference about what informants would be likely to say given their knowledge and intentions: In their minimal model, an informed and helpful informant should be consistently accurate, an informed and deceptive informant should be consistently inaccurate, and an uninformed informant should be stochastic. Learners can therefore observe informants' expressed beliefs and the state of the world to infer their informational qualities and later leverage these inferences on novel issues. These mechanisms readily generalize to groups of informants if group membership is taken to reflect stable traits (Landrum et al., 2015) and can thus generate persistence when individual members of a group appear to be uninformed.

The Ontological Path to Persistence

> Brandon loves eating meat and believes that it is morally okay to do so. He is aware that many vegetarians disagree with him—and he respects their personal preference. Yet their views do not influence his: To Brandon, there are no right or wrong answers to moral questions, just subjective opinions. And even if there were some universal moral code that establishes the "truth" about the morality of eating meat, he is convinced that no one knows what it is, anyway.

Brandon persists in his view about the morality of eating meat based on issue-level judgments—such as the impossibility of identifying shared moral "truths." This impossibility can result from either the truth of a statement being fundamentally agent relative (i.e., subjective), inaccessible (i.e., unknowable), or both. These judgments are ontological, in the sense that they concern the *nature* of the issue at stake, such as whether it is a matter of preference or fact.[4]

Ontological Persistence: Judgments of Subjectivity

Whereas beliefs and decisions in some domains (such as medicine and mathematics) are perceived as objective, other domains (such as fashion and romance) are seen as subjective (Kuhn et al., 2000). There is a deep connection between such subjectivity and disagreement captured by the Latin adage *de gustibus, non est disputandum* ("in matters of taste, there can be no disputes"). This is because aggregate "truths" about subjective issues are ill-defined—there is no such thing as the best song for everyone, for instance, but there may be a best treatment for an illness (Kivy, 2015). To the extent that an issue is considered subjective, others' opinions thus become epistemically irrelevant to our beliefs (Egan, 2010). Note how perceptions play a key role here: Ontological persistence does not require a statement to in fact be subjective—it merely requires people to believe that it is.

[4] Note that whether such matters of preference can be talked about probabilistically (and hence whether our Bayesian analysis of disagreement applies for such cases) depends on one's interpretation of probability theory, with subjectivist interpretations permitting this analysis (see Hájek, 2023 and Yeo, 2022 for relevant analysis and discussion). It is also possible that as a matter of psychological fact, people find it unnatural to express some beliefs in probabilistic terms (Vesga et al., 2024).

We are not aware of any direct work examining measures of belief change in response to subjective versus objective disagreements. However, research in three domains provides support for the idea that subjectivity can generate persistence. First, linguists, psychologists, and philosophers have examined "faultless disagreements" (Kölbel, 2004), cases where people are willing to endorse claims such as "both people can be right" instead of the claim that "one person is wrong" despite characters explicitly negating each other (e.g., if Sam says, "this wine is tasty," and Alex says, "no, this wine is not tasty"). The fact that people frequently endorse these claims for both aesthetic (Kaiser & Rudin, 2021) and moral disagreements (Sarkissian et al., 2011) suggests that they may persist by not recognizing others' views as having a bearing on their own (e.g., by forming a relativist or multiplist framing; Goodwin & Darley, 2008; Kuhn, 2020). Second, consumer psychologists have shown that people draw stronger inferences from others' judgments and decisions for objective choices (e.g., for purchasing electronics) than subjective choices (e.g., choosing movies to stream) and find others' reviews more helpful in these domains (Dai et al., 2020; Spiller & Belogolova, 2017). This suggests that subjectivity can generally lead to a discounting of others' views. Finally, research in advice taking and social comparison has shown that people are more likely to seek consensus information for tasks that they perceive to be objective (Olson et al., 1983; Spears et al., 2009).

What underlies perceptions of subjectivity? One factor is the presence of disagreement itself. For instance, presenting people with evidence that many others disagree with them decreases their perceptions of the objectivity of moral claims, such as whether downloading a TV program in violation of copyright laws is immoral (Goodwin & Darley, 2012). Similarly, greater perceived consensus regarding the moral status of a claim predicted greater perceived objectivity (for similar findings about nonmoral claims, see Heiphetz & Young, 2017). Disagreement can thus lead to judgments of subjectivity, which in turn allow individuals to persist amid said disagreement, resulting in entrenched cleavages of opinion. Other facts about the issue can prevent such entrenchment: For instance, some issues can be seen as ultimately objective but currently lacking decisive evidence (e.g., consider dissent over the properties of a newly synthesized chemical compound). In such cases, diversity of opinion may not lead to judgments of subjectivity (Yang et al., 2023).

In contrast to informational persistence, subjectivity-based persistence does not depend on negative judgments of the disagreeing party. Perhaps for this reason, "ice-breakers"—introductory activities that establish rapport—often rely on sharing of preferences (Chlup & Collins, 2010). However, not all beliefs justified on ontological judgments are ice-breaker material.

Ontological Persistence: Judgments of Unknowability

Does hell exist? Some domains, such as religion, raise important questions that many expect to be beyond human understanding; others, such as science, raise questions that we expect to have discoverable answers (e.g., whether the moon causes tides; Davoodi & Lombrozo 2022b; Liquin et al., 2020). If people expect the truth of a statement to be fundamentally unknowable, they may persist in their beliefs amid disagreement without assuming that others have weaker epistemic standing (since no one's judgment on the issue is informative).

Recent work has found that people have systematic beliefs about what is knowable and by what means (Heiphetz et al., 2021). For instance, people judge some psychological phenomena (such as conscious experience and belief in God) as more likely than other phenomena (such as depth perception) to fall beyond the scope of what science can explain (Gottlieb & Lombrozo, 2018). Similarly, children and adults gravitate toward informants who show "virtuous ignorance"—that is, acknowledging ignorance about unknowable matters, such as the number of blades of grass in New York (Kominsky et al., 2016).

More direct evidence pertaining to unknowability judgments comes from recent studies on "paradoxical knowledge," where people recognize something as unknowable but claim to know it nonetheless. Paradoxical knowledge is commonplace across domains (with a majority of participants in a recent study endorsing at least one claim similar to the following participant-generated example: "I know that there is no God … I know this, even though it is unknowable"). Paradoxical knowledge is particularly prevalent for goal-relevant beliefs and is associated with a willingness to join and adhere to extreme groups (Gollwitzer & Oettingen, 2019). Relatedly, research on conspiracy theories has identified widespread incoherence in conspiratorial beliefs that is accompanied by paradoxical judgments of unknowability (e.g., that climate change cannot be predicted, but that we are heading into an ice age; Lewandowsky et al., 2018; M. J. Wood et al., 2012). And people can inject unknowability into their construal of key political and religious issues when facts threaten preexisting worldviews (Friesen et al., 2015).

Mechanisms of Ontological Persistence

Little work has offered mechanistic accounts of how people infer knowability (but see Johnson et al., 2016, for promising preliminary work). In the case of subjectivity, however, one promising approach models judgments about subjectivity versus objectivity as the result of a hypothesis-testing problem. Specifically, Ayars and Nichols (2020) contrasted two hypotheses: Either "there is a single fact about whether *P* …" (call this hypothesis *objectivity*) or "there is no single fact about whether P; rather, whether *P* holds is relative to context or culture" (call this *subjectivity*). Interestingly, while subjectivity can explain every observation that objectivity can, it can be a worse hypothesis. For example, if 95% of adults believe *P*, and adults are reliable fact trackers, objectivity explains the consensus (95% correctly inferred that *P* is true) but fails to explain the dissent (5% must be noisy or wrong). In contrast, subjectivity can explain both sets of observations (95% are in Context A, where *P* is true, and 5% are in Context B, where *P* is false). Because subjectivity can explain *every* set of observations, however, it is not a good explanation of any *particular* case (Blanchard et al., 2018). Objectivity is thus a more likely explanation for the subset of cases that it expects (namely, cases of consensus) and an unlikely explanation for the subset it does not expect (namely, split opinion). This inference process—evaluating the relative likelihood of subjectivity and objectivity as hypotheses given opinion distributions—is a candidate mechanism for ontological persistence in cases of split opinion.

The Functional Path to Persistence

> Matt works at a rifle store in Texas and often discusses gun laws with his family. He shares their belief that gun laws in the United States are too

restrictive and owns an impressive collection of munitions at home. Moreover, his belief in the unrestricted right to bear arms grounds much of his understanding of what it means to be an American, a Republican, and a proud Texan.

Matt's case illustrates the many functions that beliefs serve, which can justify persistence: Changing his views about guns could cost him his job and alienate him from his loved ones, in addition to jeopardizing his larger worldview and sense of self. We cluster these functional values of beliefs into two categories: inter- and intrapersonal.

Functional Persistence: Interpersonal Drivers of Belief

Beliefs play a profound role in our social lives. Having the wrong beliefs in the wrong context can get you shunned, exiled, or executed (Poliakov, 2003). Historically, clashes between groups with different sets of beliefs have driven much animosity, war, and bloodshed (Golman et al., 2016)—and even today, much armed conflict in the world arises over differences in beliefs (Svensson, 2013).

Beliefs are consequential in part due to their social function as signals of group affiliation. Signaling the right affiliations by curating group-congruent beliefs can allow people to reap the benefits of social integration (Thoits, 2011) while avoiding the costs of social exclusion (Roberts et al., 2021). Accordingly, people form beliefs on novel issues that align with those of their in-group (Kahan, 2010) and infer that out-groups have beliefs that differ from their own (Dion, 2003). Foundational studies in social psychology, such as Sherif's studies in group conflict, demonstrate the strength of these pressures: even groups that are formed randomly and arbitrarily can generate prejudice and discrimination (Sherif, 1956; Taijfel, 1970).

Forming beliefs that align with one's in-group can be facilitated by the structured networks of shared commitments in which individual beliefs are embedded (Dalege et al., 2025). Political ideologies, for instance, can align beliefs on the basis of common principles (Brandt, 2022)—a libertarian might believe that both environmental protection agencies and federal grant programs should be abolished due to an underlying commitment to small government, for example. Thus, the interpersonal costs of belief change are not incurred merely at the level of individual issues but also at the level of the broader worldviews and identities that they reflect (Elder & O'brian, 2022), with incoherence signaling either a lack of commitment (Kurzban & Aktipis, 2007) or incompetence (Mercier, 2012).

Alternatively, people may privately conciliate in response to encountering disagreement with the out-group but choose not to express divergent beliefs to their in-group (Noelle-Neumann, 1977). That 62% of Americans today say they have political beliefs they are afraid to share (Cato Institue, 2020), and recent evidence that partisans "parrot the party line but do not vote it" (Lenz, 2013) supports this idea. However, such dissonant beliefs may erode over time (Harmon-Jones & Mills, 1999), in part due to the difficulty of sustained deception (Schwardmann & van der Weele, 2019; von Hippel & Trivers, 2011), and in part due to a preference for expressing authentic beliefs (Brown et al., 2022; Oktar & Lombrozo, 2022). Deceit and lies are punished heavily, and recovery strategies (e.g., apologies, promises, and consequent honesty) can fail to reestablish trust, even over long time horizons (Schweitzer et al., 2006). Moreover, people who are lying experience cognitive load and nervousness (Vrij, 2000) and report having a quarter of their lies detected in daily life (DePaulo et al., 1996). The high cost of deceit and real possibility of detection suggest that privately maintaining dissonant beliefs is a strategy that, at best, trades-off interpersonal for intrapersonal costs (e.g., experiencing nervousness but not exclusion), and at worst, results in harm to relationships beyond that incurred by merely expressing disagreement.

In sum, beliefs have important social functions and consequences—such as exclusion and prejudice—that can drive people to maintain group-consistent beliefs and persist.

Functional Persistence: Intrapersonal Drivers of Belief

Beyond signaling group membership to others, beliefs play a foundational role in the construction and maintenance of social identities and self-concepts (Hogg & Smith, 2007). People develop beliefs consonant with social groups in the process of *becoming* group members, which transforms their senses of self (Turner & Reynolds, 2012). Disagreements thus challenge not just people's beliefs on particular issues (e.g., are gun regulations too lax?), but also their identities (e.g., am I a Republican?) and the inter- (Hogg et al., 2017) and intrapersonal (Breakwell, 2015) functions of those identities, the latter including organizing and giving meaning to lived experiences (Epstein, 1973) or predicting one's own responses to the world (Swann et al., 2007).

More generally, dissent can induce uncertainty and ambiguity, which complicate decision making. Accordingly, people may persist amid dissent to preserve decision-promoting beliefs (Kagan, 1972; Kruglanski, 2004): I may have to decide whether to vaccinate on a given date, and it may be inefficient for me to debate the pros and cons endlessly, as opposed to committing to a course of action. Relatedly, self-esteem facilitates decision making and the pursuit of long-term goals (Bandura, 1982). Given that disagreement can lower confidence (Pool et al., 1998), people may also persist in their beliefs to protect their self-esteem: If I am a staunch pro-vaccine advocate, doubting my stance on vaccines could lead me to doubt my capacity to form robust beliefs on key issues, reducing my self-esteem. Accordingly, self-affirmation makes people more persuadable on controversial issues (e.g., beliefs regarding capital punishment) amid dissent (Cohen et al., 2000).

Beyond providing value by guiding decisions, mounting evidence suggests that beliefs are a source of value in and of themselves—that is, beliefs are not merely a means to an end (in service of decision making or signaling), but also directly confer utility (Bénabou & Tirole, 2016; Loewenstein & Molnar, 2018). For instance, beliefs have affective consequences: Religious belief can buffer against existential anxiety (Norenzayan, 2013), and just-world beliefs promote a sense of safety and happiness (Hafer & Sutton, 2016); similar examples abound (Abramson et al., 1989; Altay et al., 2023; Davoodi & Lombrozo, 2022a). When these considerations anchor beliefs, epistemic evidence from disagreement may not be relevant. Such "returns" provided by a belief can consciously or subconsciously guide people's likelihood of persisting in that belief, in line with the literature on motivated reasoning (Cusimano & Lombrozo, 2023; Epley & Gilovich, 2016) and with work on the functional approach to the study of attitudes (Katz, 1960; Shavitt, 1989).

Mechanisms of Functional Persistence

Theories of belief-based utility locate the mechanisms of functional persistence in value-based decision making (Sharot et al., 2023). From this perspective, evaluating the utility of a belief amounts to computing a weighted sum of the outcomes of holding that belief—including the inter- and intrapersonal costs and benefits noted above. This multidimensional estimation problem requires integrating subjective estimates of the value of a belief along such dimensions, weighted by their perceived importance and the amount of uncertainty with which the values are represented (Bromberg-Martin & Sharot, 2020). For instance, Matt, the Texan gun-owner, might be confident (i.e., have low uncertainty) about the interpersonal costs of changing his beliefs about gun legislation (i.e., that they are high), and these costs might outweigh potential accuracy benefits he would obtain from updating his beliefs. In this way, mechanisms of value-based decision making can function as mechanisms of functional persistence.

The Computational Path to Persistence

> Lisa believes that many vaccines cause infertility. She has no expertise in biology and could not articulate a plausible mechanism that would explain how vaccines might cause infertility—but she is unaware of how shallow her understanding is. She was recently channel surfing when a poll on vaccination beliefs flickered on her television. She consciously registered the poll but skipped it without paying much attention to it or thinking about it in depth; there were better things to watch, and she was already convinced that many people agree with her.

Lisa's case illustrates how cognitive constraints—from patchy representations to limited attention and flawed reasoning—can drive persistence. Lisa (falsely) believes that many support her views, and when she encounters evidence to the contrary, she prioritizes other tasks instead of revising her views based on the disagreement. Moreover, even if Lisa tried to update her beliefs about vaccination, her lack of understanding would pose challenges for how she ought to revise her views. We can categorize such limitations as constraints on our internal representations of relevant issues and constraints on the kinds of reasoning we can deploy over those representations.

Computational Persistence: Constraints on Representations

Appropriately responding to societal disagreement requires accurately representing the presence and properties of disagreement. However, research on pluralistic ignorance suggests that people frequently "operate within a 'false' social world" (Fields & Schuman, 1976, p. 427) and misestimate the distribution of others' beliefs (Shamir & Shamir, 1997)—typically by overestimating support for their own views (Mullen et al., 1985; Ross et al., 1977) and sometimes overestimating dissent on fringe issues (Westfall et al., 2015; Yudkin et al., 2019). Such inaccurate representations can drive persistence in many ways. For example, when people update their beliefs about societal dissent, they combine their prior beliefs with polling data (Stoetzer et al., 2024). If misperceptions are held with sufficient confidence, people may update their beliefs about societal dissent very little, if at all, based on the poll. If people do not learn *about* dissent and instead continue to underestimate it, they will not learn from it either.

Beyond inaccuracy, mental representations can lead to persistence by being redundant, incomplete, or inconsistent (Bendaña & Mandelbaum, 2021; Converse, 2006; Sommer et al., 2023), rather than perfectly integrated (e.g., in a Bayesian network). Mounting research suggests that people are unaware of pervasive flaws in their representations (Chater, 2018)—for example, nonphysicists might believe that gravity exists but find themselves grasping at straws if asked to explain why (Rozenblit & Keil, 2002). If people lack integrated representations of their beliefs, they may "persist" because they do not have a particular, "true belief" about an issue to update. As Zaller summarized,

> For most people, most of the time, there is no need to reconcile or even to recognize their contradictory reactions to events and issues … individuals do not typically possess "true attitudes" on issues … but a series of partially independent and often inconsistent ones. (Zaller, 1992, p. 93)

For instance, Lisa could persist in her views by seeing a poll on the news, storing the belief that vaccines are perfectly safe, and simultaneously maintaining her view that vaccines cause infertility (Mandelbaum, 2019; Sommer & Lombrozo, 2025).

Computational Persistence: Constraints on Reasoning

Constraints on time and computation shape reasoning (Griffiths, 2020). Often, we need to solve complex problems quickly, using a finite pool of neurons, and we do so by efficiently allocating our cognitive resources: For example, strategically deploying attention to task-relevant information (Sims, 2003) and setting goals that triage tasks (Shenhav et al., 2017). Such efficiency comes at a cost: information that is not relevant or valuable is ignored, often 'going in one ear and out the other' (Craik & Lockhart, 1972). Since learning about societal controversies is often not a priority in everyday life (Lupia, 2015)—especially with the engineered distractions of the modern age (Williams, 2018)—people may persist amid dissent simply by choosing not to engage with it in many cases. Note that these cases are distinct from people not changing their beliefs because they do not perceive disagreement at all (e.g., if Lisa was in another room when the poll flickered on her television)—these cases require the selective allocation of attention away from disagreement, which requires perceiving it to some extent.

Beyond failing to deploy reasoning, people can reason in ways that shield their existing beliefs from societal dissent. For instance, they can reason without sufficient effort, relying on learned or heuristic associations (e.g., thinking "I'm probably right") instead of thinking critically (Pennycook & Rand, 2019); reason in ways that preserve their capacity for constructing persuasive arguments (vs. aiming at truth; Mercier & Sperber, 2011); and come up with ad hoc theories that explain away the informativeness of dissent (Gershman, 2019). Indeed, much research has established various fallacies in the reasoning of conspiracy theorists (Lewandowsky et al., 2018; M. J. Wood et al., 2012)—fallacies that are a consequence of flawed reasoning and that can result in persistence.

Mechanisms of Computational Persistence

Because computational persistence results from limitations in representations or resources that can take various forms (such as

fragmented representations vs. heuristic processing), we do not expect it to map on to a single mechanism or even a small handful. However, one observation is likely to hold quite generally: for the complex, real-world issues that seem to lead to persistence, bounded agents like us will need to employ strategies to reduce complexity and computational intractability. Pothos et al. (2021) argued that reasoning about complex issues requires simplifying their representations for cognitively bounded agents, as with just 10 relevant considerations, full Bayesian inference entails evaluating an implausible $2^{10} = 1024$ possibilities. Individual variation in simplifications can lead to incommensurable representations, blocking learning and leading to persistence (Oktar, Sucholutsky, et al., 2024).

Ambiguous Cases and Assumptions

The examples presented so far were selected to support unambiguous classification within a single path, but some real-life instances of persistence are likely to be underspecified or hard to sort. Consider a case in which someone encounters disagreement concerning a claim that is central to their identity—for instance, a transgender woman learning that others disagree about how to define gender. Empirically, it may be hard to disentangle different drivers of persistence: If she decides not to spend more time thinking about the disagreement (and thus persists), this could be due to informational considerations (others are biased or uninformed), functional considerations (she is motivated to maintain her view), or computational considerations (time is a limited resource). In fact, these paths are not mutually exclusive and can in some cases reinforce one another, as we consider under *Interactions Across Paths*, below. But this does not mean that the paths are not conceptually and empirically distinct, as reflected in the fact that they make different (counterfactual) predictions. For instance, in cases where the computational path is a primary driver of persistence, increasing resources (such as time and effort) should have effects, even when informational and functional considerations are held fixed. If the functional role is instead (or additionally) playing a causal role, then changing functional considerations should change persistence, even holding informational and computational factors fixed. More generally, the empirical challenge of disentangling paths in complex cases should not be taken as evidence against the *conceptual* independence of the paths, even if—in practice—they can be correlated and interact.

As with all models, the PPM leaves some unexplained variation on the table while usefully describing the rest (Box, 1976)—in particular, our model omits granular detail about context- and person-specific factors that generate persistence in any given case while providing structure that can explain why these factors, at a high level, cause persistence, much as biological taxonomies do not account for individual mutations but instead aim to capture interpretable clusters of characteristics that separate species (Padial et al., 2010).

Relatedly, our descriptions of the subpaths is unlikely to be exhaustive. In the case of the functional path (which by definition involves factors that influence the *person*), we expect the intra- and interpersonal subpaths to cover the full range of possibilities, with the additional proviso that some cases of persistence might involve a blend of both subpaths. For the ontological path, by contrast, we do not claim to have spanned the full space of ontological dimensions—future work could reveal considerations beyond subjectivity and unknowability that offer an ontological path to persistence. It could also prove useful to offer more fine-grained characterizations of subpaths. For instance, within the informational path, someone might persist if they take disagreeing others to be dishonest informants (Shafto et al., 2012). While this could be seen as an aspect of *processing* that introduces bias or systematic distortion, it might also merit its own subpath. Rather than building in all possible subpaths at the outset, we intend the PPM to be used as a generative framework for future research that expands our understanding of each path to persistence and eventually the heterogeneous mechanisms that support it.

Finally, disagreements can persist without people persisting per se. This may happen due to biased informational networks (e.g., information silos) that drive persistent opinion dynamics at the societal level (Cinelli et al., 2021; Dinas, 2014) or in highly insulated communities where societal opinion may be inaccessible (Axelrod, 1997; Flache et al., 2017). We do not focus on external network effects here, as the paths to persistence outline individual psychological mechanisms. Note that this focus on individual-level mechanisms also precludes discussion of group-level mechanisms that may shape persistence. For instance, some identity-relevant beliefs may be functionally advantageous for the social group (in defining a collective identity) and may thus be maintained through cultural mechanisms even when they fail to confer functional benefits to particular individuals (Smeekes & Verkuyten, 2013; Wilson et al., 2008).

Interactions Across Paths

As Theo, Brandon, Matt, and Lisa's cases illustrate, each path can offer a sufficient basis for persistence. This gives us some insight into the prevalence of persistence: For most important real-world controversies, it is likely that at least one path will be available to support persistence. However, there is good reason to think that these paths often interact, dynamically reinforcing or substituting for each other in generating persistence. Here, we describe three plausible pairwise interactions that emerge from the first three paths. We illustrate these interactions through examples drawn from research on adjacent questions (since no past work, to our knowledge, has investigated these interactions in the context of societal dissent).

First, paths can moderate each other's influence. Perhaps the most salient interaction in the PPM is that between the informational and ontological: For objective and knowable issues, others' evidence and intellect should have a large effect on persistence; for subjective or unknowable issues, this effect should be attenuated or eliminated. Accordingly, highlighting the subjectivity of judgments in a domain (e.g., art)—hence enabling ontological persistence—can reduce the extent to which participants judge those who disagree with them as biased (Cheek et al., 2021). Similarly, children are less likely to judge disagreeing others as uninformed or unintelligent in more subjective domains, such as cultural disagreements (Wainryb et al., 2001).

Second, paths can be synergistic. Because informational reasons can provide convincing arguments for sustaining belief, we might expect persistence to be especially likely when people have both informational and functional considerations supporting persistence (Mercier, 2016; Tetlock, 2002). On the flip side, questioning could be especially likely when neither path is available. Accordingly, anti-climate change attitudes are more pliable when informational interventions are coupled with self-affirmation exercises that attenuate the discomfort of view change (van Prooijen & Sparks, 2014), and

affirmation can generally increase the persuasive power of messaging (Cohen et al., 2000; Steele, 1988).

Finally, interactions can cause reversals. For example, though subjectivity is often a path to persistence, it can also enable questioning when it is socially desirable to question and conform (e.g., consider the rapid adoption of aesthetic fads; Bikhchandani et al., 1998). This is because it is harder to appear competent if you frequently change your mind in arguments about ostensibly objective issues, but subjectivity offers a route to conciliating without social costs. Accordingly, early work comparing conformity on objective versus subjective statements in small-group discussions with *peers* found that subjectivity led to higher conformity (Blake et al., 1957), whereas similar work on *anonymous*, online interactions finds that subjectivity drives persistence (Wijenayake et al., 2022), plausibly due to the absence of interpersonal consequences to dissent.

Such interactions are likely to be the norm rather than the exception. Consider, for example, how social identity processes suggest many interactions between the functional path and the others. Group membership not only influences informational perceptions of disagreeing others' credibility (Cruz, 2020) but also ontological evaluations of the unknowability of issues through group-based epistemologies (Fage-Butler et al., 2022), and even the computational resources allocated to evaluating disagreement when it arises from in-group versus out-group sources (Mackie et al., 1992). These are just a subset of the many interactions related to social identity, which is itself just one of many sources of possible interactions.

Beyond the relatively simple pairwise interactions just discussed, there are likely more complex dependencies across paths that guide persistence. Most obviously, higher order interactions (e.g., Informational × Ontological × Functional) may have an influence, and considerations from the computational path could influence whether and how other paths are pursued. If reasoning about controversy is a sequential process, more subtle dependencies may arise as well: Initial evaluations of one path could influence subsequent evaluations of other paths, resulting in complex, time-dependent interactions. Further complicating the picture are possible interactions across specific subpaths (e.g., judgments of Bias × Unknowability). The pairwise interactions described above are thus meant to illustrate the possibility of rich dependencies, rather than offer a comprehensive set of predictions.

The PPM Subsumes Alternative Models of Persistence

We are not aware of any existing theories that directly tackle the question of how beliefs persist amid societal dissent, but many existing theories of belief, conformity, persuasion, and attitude change bear on persistence. We consider these models not as competing alternatives but integral components of our broader account. As components of a larger whole, they individually fail to capture important aspects of persistence. We first provide examples of seminal theories that map onto individual paths of the PPM and then discuss theories that capture multiple paths.

Models of social learning dating back to Condorcet's Jury Theorem (Dietrich & Spiekermann, 2023) focus on the *informational* roles of inferred competence (Landrum et al., 2015), source dependence (Hahn, 2024), and bias (Austen-Smith & Banks, 1996) in shaping ideal inferences from opinion. On the other hand, models of conformity, such as Latané's social impact theory (Nowak et al., 1990) or the social influence model (Tanford & Penrod, 1984), outline how *functional* considerations, such as the status, proximity, and quantity of disagreeing others, influence responses to dissent (Cialdini & Goldstein, 2004). *Ontological* factors are captured in models of intuitive epistemology, such as the reflective judgment model (King & Kitchener, 2002), which illustrates how individuals progress from viewing knowledge as absolute and certain to recognizing its contextual and constructed nature, with implications for belief revision (Kuhn, 2020; Muis et al., 2006). Finally, models of resource-rational responses to dissent outline how bounds on *computational* capacities can cause persistent disagreements—when, for example, agents simplify issues into incommensurable perspectives (Pothos et al., 2021).

Several models incorporate multiple paths as core components of social belief change. Toelch and Dolan's model of conformity (2015), for instance, incorporates both informational and interpersonal functional considerations in a Bayesian framework. Similarly, Bromberg-Martin and Sharot's (2020) model of value-based belief incorporates informational and *intrapersonal* functional considerations. Models of cognitive dissonance (Cooper, 2007) and cognitive closure (Kruglanski & Fishman, 2009) also describe how inconsistencies between beliefs (including those elicited through dissent) are resolved in accordance with the informational and functional context. Instead of listing additional related models, we concretely illustrate how the PPM relates to alternatives through a final example: the elaboration likelihood model (ELM; Petty & Cacioppo, 1986).

The ELM describes how people process persuasive messages through either careful evaluation (the "central route") or mental shortcuts (the "peripheral route"). The central route aligns with the informational path through its focus on careful evaluation of evidence and arguments. The peripheral route corresponds to the computational path by highlighting limited cognitive resources and reliance on heuristics. The ELM's consideration of personal relevance and motivation as drivers of the extent of elaboration reflects an interaction between functional and computational factors in the PPM. However, the ELM lacks explicit incorporation of ontological considerations.

No past framework, to our knowledge, has aimed to synthesize the potentially interacting influence of all four factors in explaining phenomena such as persistence and belief change, despite recent calls in related literature for "an overarching theoretical model that aims to integrate cognitive, social, and affective factors" (Ecker et al., 2022, p. 25). The PPM addresses this important gap.

Part 3: Empirically Examining Paths to Persistence

When introducing the PPM, we identified its key value proposition: it supports empirical generalizations and provides the language necessary to broaden and integrate siloed perspectives. Our theoretical and empirical discussion thus far already goes some way toward making good on this proposition: We have argued on theoretical grounds that the four paths we identity are coherent and exhaustive, and we have shown that they offer a way to systematize existing work across the social sciences (generating some new predictions along the way). In this section, we offer a more direct empirical test of the PPM in the form of a novel study with the primary aim of demonstrating the psychological reality and value of

the model. First, we aim to show that the PPM captures responses to controversy, in the sense that the paths correspond to coherent and distinct factors. Second, to show that our paths accomplish psychological work, we test whether our factors in fact predict persistence and whether they predict downstream consequences of persistence (such as unwillingness to befriend others who disagree). Our analyses not only consider main effects of paths on these dependent variables but test and find interactions as well—not only supporting our theoretical predictions but also demonstrating the importance of considering multiple paths in the context of a unifying framework.

As one of the first comprehensive investigations of responses to *societal* dissent (vs. responses to disagreeing individuals), this study also answers several basic questions about responses to dissent: Is persistence as common a response to dissent as it intuitively seems? Does it occur even when people vastly underestimate dissent? And do the mechanisms that support persistence differ across domains? These are all foundational questions, in the sense that they can ground and organize subsequent inquiry into the nature of controversial beliefs across disciplines.

We examined these questions in an online study with a novel stimulus set of 96 controversies across four domains, using a sample quota-matched to the U.S. census on key demographics. After describing the design and results of this study, we also report several related studies that support and extend our results.

Method

Participants

In Study 1, we preregistered a target sample of 1,250 participants (all preregistrations, materials, data, and analysis scripts are available in our open-access repository at https://osf.io/389as; Oktar, 2025). Participants were recruited through Prolific on April 9, 2024, and were quota-matched to the U.S. census on race and sex with the intention of improving the generalizability of our results across these demographic factors.[5] Participants were paid $2.40 for a 12-min study (at a rate of $12 per hour). We preregistered three criteria for exclusions, which resulted in a high exclusion rate (likely because a memory item was too difficult).[6] To ensure that our findings are generalizable to the broader population, high quality, and robust to our choices about exclusion (Steegen et al., 2016), we therefore conducted our main analyses in two ways: First, using all attention checks in accordance with our preregistered analysis plan; second, without using the memory item that resulted in high exclusions. The article includes results from the first set of analyses ($N = 737$)—we identify any differences across data sets where appropriate and include both sets of analyses in our Supplemental Materials (SMC1-2).

All reported studies were approved by the Princeton Institutional Review Board.

Materials

To investigate responses to controversy in a generalizable manner (Yarkoni, 2022), we curated a novel stimulus set of 96 controversial propositions that span four domains: politics, morality, religion, and science. Our choice of domains was based on theoretical, methodological, and practical considerations. Theoretically, we built on past research on the psychology of belief, which has focused on these domains and identified relevant variation in each (e.g., Davoodi & Lombrozo 2022a; Friesen et al., 2015; Wainryb et al., 2004). Methodologically, these domains offer wide coverage of the issues that polling agencies tend to focus on (see Supplemental Materials SMA1 for a list of issues Pew Research covers), which allowed us to scrape a large set of polls from their databases. Practically, these domains cover issues of substantial relevance to society and policy, from abortion to vaccination, and are therefore important to study. Our selection of issues within these domains was motivated by two additional considerations: first, our intent to collect a balanced sample of issues across levels of controversy, and second, the need to collect recent polls so that participants did not explain away disagreement by claiming that public opinion had shifted to align with their views since the poll.

The stimuli were drawn from recent public opinion polls conducted by major polling agencies (primarily Gallup, Pew Research, and YouGov surveys with nationally representative samples in the last 10 years) and were systematically sampled to cover differing levels of disagreement with participants' beliefs, from "low" cases of split opinion (50%–66%) to "medium" cases in which a strong majority disagrees with the participants' views (66%–84%) and "high" cases in which adults in the United States overwhelmingly disagree (84%–96%; see Figure 3). We sampled eight controversies for each combination of our four domains and three levels of disagreement, resulting in 96 controversies.

A list of the controversies included in the stimulus set is available in our Supplemental Materials (SMA1; Supplemental Table A1). To increase the accessibility of these materials for future research and the public, we also created an interactive website (the *Controversy Explorer,* available in our Open Science Framework repository; see Supplemental Materials SMA1 for details).

Procedure

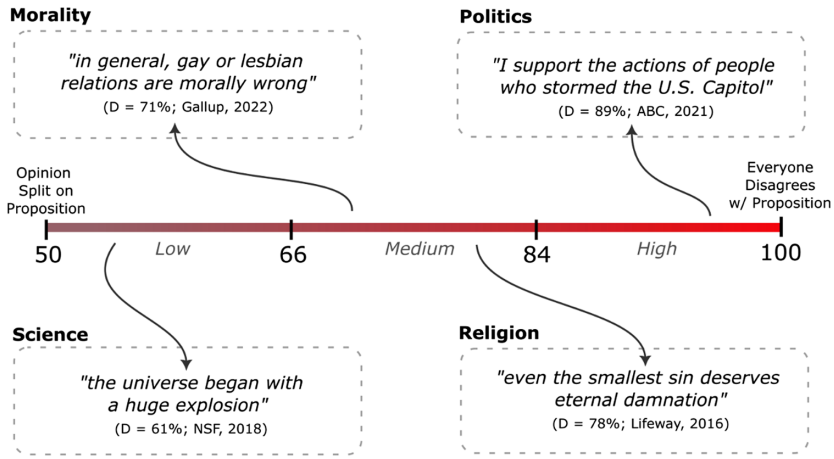
Participants first provided consent and were randomly assigned to one of our four domains. They then completed three blocks of the same measures with different sets of issues, each corresponding to issues in a particular disagreement range. For instance, a participant assigned to politics might first encounter the "medium" disagreement block, in which they were asked to identify which of the eight issues in Figure 4 they agreed with. The order of the disagreement-level blocks was randomized across participants.

[5] We used the nationally representative sample provided by Prolific, which additionally quota-matches to the census on age, but failed to recruit 19 participants in the 75+ age range from the available pool after 2 months. We decided to fill those 19 slots with younger participants such that we maintained a sample matched on race and sex.

[6] First, a time-based criterion identified participants who completed the survey in less than 5 min (which leaves participants less than 5 s per question); 21 participants were under our threshold. Second, a self-report multiple-choice question identified participants who were at least "a little distracted" and "sloppy" when taking the survey; 15 participants indicated being distracted, and four participants did not answer this question. Third, a memory-based multiple-choice question identified participants who did not recognize the wording of two of the measures in the study; 224 participants did not recognize the first measure, 338 did not recognize the second, and 750 participants identified both measures and none of the 10 distractor items. The high exclusion rate on this final check suggests that it may have captured factors beyond attentiveness (e.g., memory capacity).

Figure 3

Example Issues Used in Study 1



Note. Participants were assigned to one of four domains and rated three sets of eight controversies; resulting in a total of 96 controversies. In the citations, "D" refers to the proportion of adults in the United States in the cited opinion polls who did not indicate agreeing with that proposition. NSF = National Science Foundation; ABC = American Broadcasting Company. See the online article for the color version of this figure.

Participants were then randomly assigned one of the issues they indicated agreeing with. They indicated how strongly they believed that issues, "I believe that this statement is" [*definitely true* (8) to *definitely false* (1), with no neutral midpoint], and how confident they were in their belief, "How confident are you in this response?" [*very confident* (5) to *not at all confident* (1)]. We repeated the issue in question above each item in the study to prevent forgetting. After indicating their own beliefs, participants were asked to estimate the extent of agreement with their own view in the United States ("What percentage of people in the United States also agree that this claim is true?" [slider scale from 0 to 100]).

Participants then encountered our view-questioning measure, where we reminded them of their own estimate of agreement ("You previously indicated believing that X% of the United States shares your view") and then provided them with the actual extent of agreement with their own view in the population ("In fact, according to a recent public opinion poll, the actual percentage of those who share your view is Y%, whereas *[100-Y]% of Americans do not share your view.**"). The asterisk linked to a footnote displaying a reference and link to the source that the statistic was drawn from, e.g., "* This data is from a nationally representative poll of Americans conducted by a major polling organization. Source: YouGov. (2022). YouGov survey: morality [Data Set]. https://docs.cdn.yougov.com/uta5gqhscr/Morality.pdf".[7] Participants then provided a binary answer to our view-questioning measure ("Does the fact that 63% of the United States does not share your view *make you question your own view?*").

Note that view questioning is distinct from belief change—questioning one's views does not require a change in one's beliefs or confidence but could result in those outcomes (Sosa, 2021). To investigate these potential outcomes, we re-measured participants' beliefs using the same belief item as before, while reminding participants of their prior answers (e.g., "You previously said that you think this statement is slightly likely to be false. Your views on this issue may or may not have changed since then"). We then asked participants to indicate their confidence in their updated belief using the same measure (note that confidence change is most easily interpreted when views did not change, as participants indicated how confident they were in their updated beliefs).

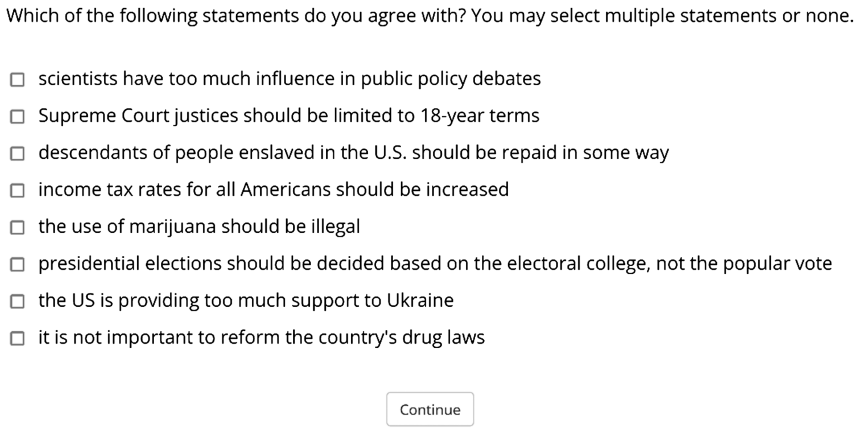
Participants then rated six items intended to measure the first three paths of the PPM. We focused on these three paths, and not the computational, for two reasons. First, the design of our study involves directly asking participants to reflect on controversies and their implications. This reduces our ability to observe important aspects of computational persistence (e.g., inattention) in an ecologically valid manner. Second, we developed the items we used in this study through extensive pilot testing and preregistered studies reported in our Supplemental Materials (see SMB1-5; we describe these studies later). In these studies, we found that participants almost never self-generated computational constraint-based explanations nor systematically agreed with close-ended items intended to track computational constraints. We return to the question of how future studies can investigate the computational path in the General Discussion.

We measured each of the informational, ontological, and functional paths through two questions (using 7-point scales, from *strongly disagree* to *strongly agree*; see Figure 5). These measures were developed over a series of studies, beginning with an open-ended study where two independent coders classified participants' open-ended explanations of why they persisted when faced with dissent. This study was followed up with a closed-ended study in which a factor analysis of a broader set of 11 items suggested a three-factor solution that could be reliably measured through a subset of the items further refined in later studies (these findings are explained in depth in the section Results of Supplemental Studies).

[7] We chose the "[100 − Y%] do not share your view" wording instead of "[100 − Y%] disagree" because some of the polls in our stimulus set do not add up to 100%, so "[100 − Y%] disagree" would have been inaccurate.

Figure 4

A Screenshot of the Disagreement Choice Screen for the Politics-Medium Block



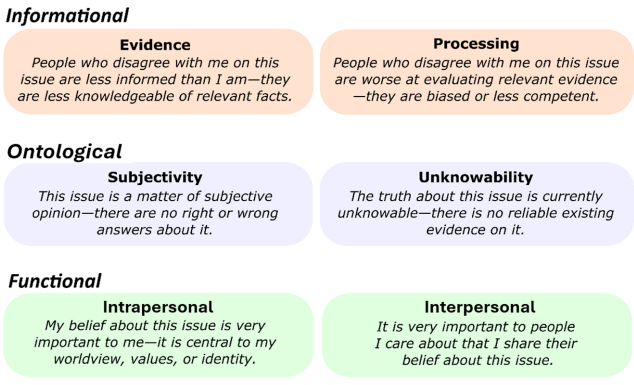
Note. If participants selected no issues, they were initially prompted to make sure that they did not hit continue by mistake and were reminded that they could choose to skip any issues. If participants did not agree with any of the statements on this screen, they would skip the block entirely.

After these questions, participants answered a final set of four social impact items chosen to represent important downstream consequences of disagreement. Past research has shown that, at the individual level, people do not wish to converse (Wald et al., 2024) or become friends with (Huber & Malhotra, 2017) disagreeing others; and at the societal level, polarized discourse can erode support for free speech (Carlos et al., 2023) and lead to a loss of trust in experts (Miller et al., 2024). We investigated these outcomes through items shown in random order and measured using 7-point agreement scales:

- [Discuss] There is no point to having conversations with disagreeing others on this issue.
- [Friends] I would not want to be friends with someone who disagrees with me on this issue.

Figure 5

Close-Ended Likert PPM Items



Note. All items were displayed on the same page, in randomized order; shown here with labels not shown to the participants. PPM = paths to persistence model. See the online article for the color version of this figure.

- [Experts] Following expert consensus is the best way to resolve this disagreement.
- [Speech] Those disagreeing with me about this are entitled to publicly voice their views.

In sum, participants chose beliefs they agreed with and indicated the strength of their beliefs. They were confronted with societal disagreement and asked to reflect on whether the disagreement made them question or change their beliefs. They then rated items measuring the antecedents and consequences of their responses to controversy (see Figure 6 for an illustration summarizing the task).

Participants then provided demographics, gender, religiosity, education, political affiliation, race, belief in public opinion polls, Leary et al.'s 6-point Intellectual Humility scale (2017) in random order, and answered the two attention check items. They were provided with an opportunity to provide optional open-ended feedback and finally received a debriefing (that contained the latest expert consensus on 16 of our scientific controversies, as well as links to government and academic websites providing further information). Readers interested in further details about the survey can demo it in our Open Science Framework repository (all preregistrations, materials, data, and analysis scripts are available in our open-access repository at https://osf.io/389as).

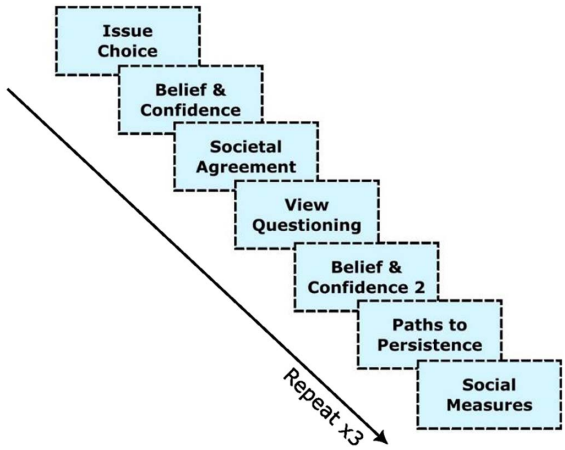
Results

Given the richness of our data, we present our preregistered hypothesis tests in the context of descriptive analyses; all preregistered analyses are preceded by the label "as preregistered" and accompanied by an explanation of any deviations.

We first ensured that participants responded to a diverse array of our stimuli (vs. agreeing with only a small subset). We received responses to all controversies—and after attention exclusions, 67 issues received at least 10 responses. Response rates were relatively consistent across levels of controversy: 37% of responses came from

Figure 6

Illustration of the Task Structure

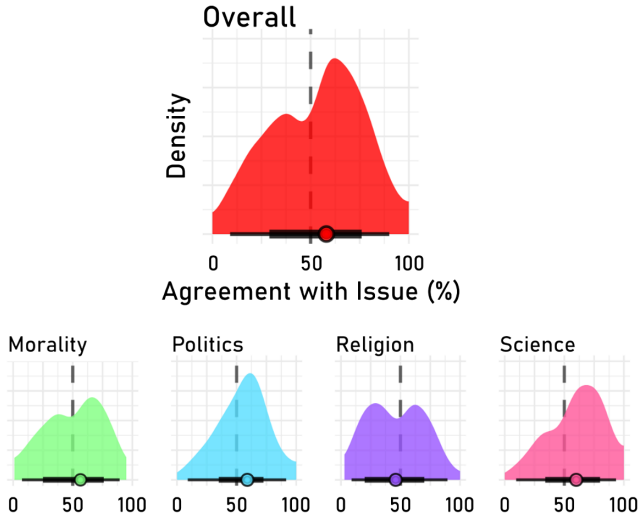


Note. Participants were free to skip any of the items they did not want to answer. See the online article for the color version of this figure.

the "low" disagreement items, 35% from the "medium," and 28% from the "high." Response rates were also consistent across domains: 27% of participants responded to religious items, 24% to political, 26% to scientific, and 22% to moral. Accordingly, we had more than 125 responses for each of the 12 disagreement-level (3) × domain (4) combinations. A full table of these descriptive statistics, as well as rates of agreement with each issue, is available in the Supplemental Materials (SMA1; Supplemental Table A2).

Figure 7

Perceptions of Societal Agreement



Note. Plots show the distribution of perceived agreement estimates; top plot shows all judgments, bottom facets show this broken up by domain. The dot in the middle of the interval at the bottom of the density shows the median, the center region shows 66% quantiles, and the thinner second region shows 95% quantiles. The *y*-axis is omitted as the plots show densities. See the online article for the color version of this figure.

We then analyzed perceptions of societal disagreement. Overall, participants recognized the presence of diverse opinion across issues: the average perceived agreement with one's own view was 52.2%, with substantial variation across individuals and some variation across domains, such that participants perceived the most agreement on scientific issues (59.0%) and the least on religious issues (46.5%), with politics and morality falling in between (see Figure 7).

Since we sampled participant beliefs for which a majority of the population disagreed—and most participants perceived at least 50% as agreeing with them—there must be a gap between participants' perceptions and the reality of public opinion. Our data show that this gap is substantial: participants overestimated population agreement with their views by 25.5% on average (in keeping with findings on the false consensus effect; see Mullen et al., 1985). The cross-domain variation in perceived agreement noted above is reflected in the variation of these errors: Participants overestimated agreement the most for scientific issues (with a 31.5% gap) and the least for religious issues (a 17.4% gap), with morality and politics falling in between (see Figure 8).

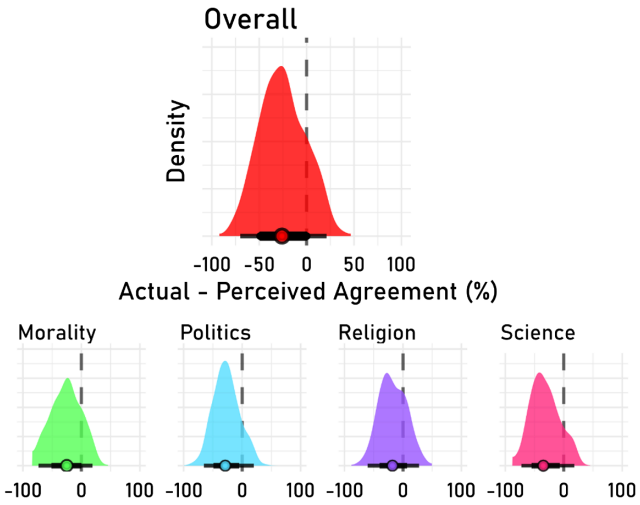
Moreover, these errors were widespread: Participants overestimated agreement on 83.7% of judgments. This means that most participants were confronted with novel evidence of disagreement—in some cases, quite substantial amounts of it (e.g., 16.6% of judgments were off by more than 50%). A key predictor of the size of these errors was the size of the actual magnitude of the disagreement: On average, participants estimated similar amounts of population agreement for issues in our low, medium, and high disagreement groups (55.8%, 51.2%, and 50.6%, respectively). This resulted in increasingly large errors across these issues (16.6%, 24.5%, and 37.6%).

Past work showing that belief change is predicted by the size of prediction errors (Vlasceanu et al., 2021) suggests that many participants may have questioned or updated their beliefs when confronted with these substantial errors in their estimates of public opinion. Across participant judgments, however, persistence was the typical response—whether operationalized as lack of view questioning, 87.9%, $\chi^2(1) = 1119.4$, $p < .001$; lack of belief change, 72.2%, $\chi^2(1) = 516.8$, $p < .001$; or lack of confidence change for participants who did not indicate belief change, 82.8%, $\chi^2(1) = 739.3$, $p < .001$. Moreover, even participants who underestimated disagreement by more than 30% overwhelmingly did not question their views (85.1%). When beliefs did change, they most often decreased in strength (20.1%). It was rare for participants' beliefs to increase in strength (4.4%) after learning about disagreement. Finally, there was variation across domains in the prevalence of view questioning: scientific issues elicited the most questioning (18.2%), and religious issues the least (6.4%), with politics (11.6%) and morality (12.6%) falling in between.

Beyond documenting responses to disagreement, we wish to explain the mechanisms driving these responses in a theory-driven manner. To do so, we examined the PPM items in our data set. As preregistered, we first conducted a confirmatory factor analysis to investigate whether the six items could be collapsed to the three paths posited by the theory. Our analyses show that a three-factor solution with the six items loading exclusively onto the three paths—that is, in accordance with the structure of the PPM—fits the data better than lower or higher dimensional solutions and satisfies standard benchmarks for factor analysis. Moreover, unconstrained,

Figure 8

Errors in Perceived Agreement



Note. Plots show the distribution of errors in agreement estimates; top plot shows all judgments, bottom facets show this broken up by domain. The dot in the middle of the interval at the bottom of the density shows the median, the center region shows 66% quantiles, and the thinner second region shows 95% quantiles. The *y*-axis is omitted as the plots show densities. Each plot features a vertical line at 0%, marking accurate inferences. See the online article for the color version of this figure.

exploratory factor models also recover the same structure (see Supplemental Materials SMA2 for details). Our data thus suggest that the PPM passes our first criterion for usefulness: it captures the structure of people's responses to dissent (a finding that we replicate in our supplementary studies using open- and close-ended data, which we turn to later). As preregistered, we therefore conducted the rest of our PPM analyses using standardized factor scores.

The distribution of factor scores reveals cross-domain variation in paths. Whereas religious belief is associated primarily with the ontological path, scientific belief is associated with the informational; morality and politics show greater balance across the paths (see Figure 9). Exploratory analyses of variance show that this cross-domain variation is significant, $F_{\text{Informational}}(3, 1947) = 12.8$, $p < .001$, $\eta^2 = .02$; $F_{\text{Ontological}}(3, 1947) = 113.3$, $p < .001$, $\eta^2 = .15$; $F_{\text{Functional}}(3, 1947) = 29.4$, $p < .001$, $\eta^2 = .04$. Note that the variation *within* each domain is even more substantial than the variation across domains (see Supplemental Materials SMA3; Figures 3–6), suggesting that there are issue- or person-specific factors that drive ratings of the paths (e.g., disagreements about COVID vaccine efficacy and policy could involve more similar judgments than disagreements about vaccine efficacy and whether humans are made out of stardust, despite the first two being in different domains—science and politics—and the latter two both being scientific questions).

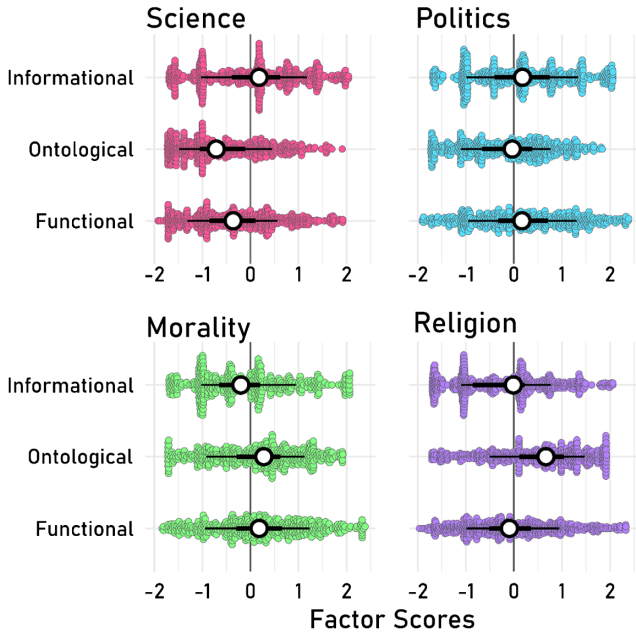
If the paths shed light on the mechanisms driving responses to disagreement, they should not only capture the structure of people's responses, but this structure should predict persistence. Moreover, if the paths jointly drive persistence, taking interactions across paths into account should substantially boost the predictive performance of our models. As preregistered, we analyzed whether the effects of the paths are interdependent by conducting nested model comparisons of all possible models (i.e., combinations of the main effects and interactions of the three paths) in predicting persistence. In accordance with our analysis plan, we use responses to the questioning measure as our outcome (though we ran all analyses using the view change measure as well, and we report any qualitative discrepancies).

To penalize models that incorporate unnecessary variables while rewarding predictive performance, we compared the Akaike information criterion (AIC) scores of these models. AIC is an estimator of prediction error that penalizes flexibility (i.e., models with more parameters but the same predictive performance have worse AIC scores). Since we intend our results to generalize across disagreements, we included random effects of our controversial issues in all models. In keeping with recent recommendations, we started with the maximally complex model and iteratively simplified it until we found a model that converged (Barr et al., 2013). We found that the most complex models that converged incorporated random intercepts and random slopes for the effect of the informational factor across issues. We also included scaled prediction error and disagreement level to these analyses to isolate the effects of the PPM. Figure 10 plots the results of this analysis (see also Supplemental Materials SMA4 for detailed parameter estimates).

Intuitively, an AIC difference of 10 points means that the better model is ~148 times more likely than the worse model to minimize information loss, as the probability that the better model minimizes information loss is proportional to $e^{\Delta AIC/2}$ (Burnham & Anderson, 2004). The best performing models thus all incorporate interactions

Figure 9

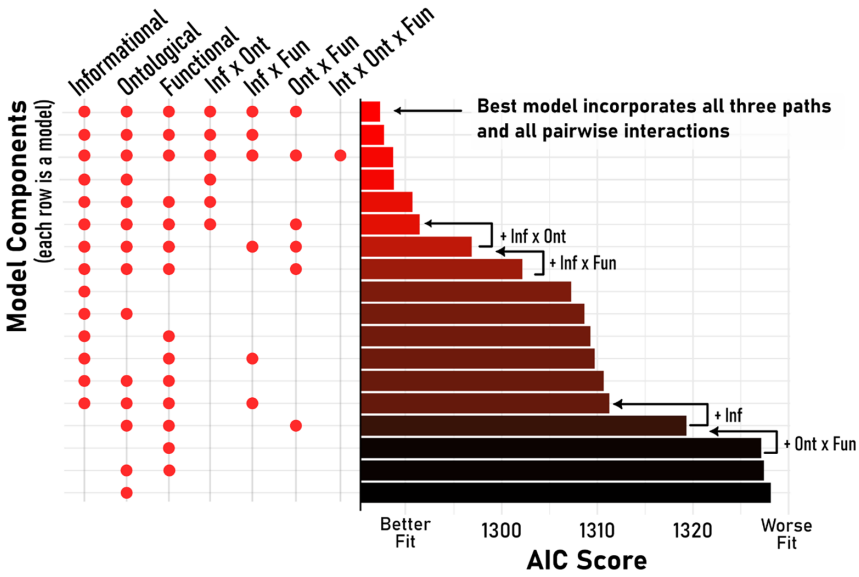
Paths to Persistence Scores Across Domains



Note. The swarm plot shows jittered factor scores for each trial; the displacement from the midpoint indicates the density. The dot in the interval shows the median, the center region shows 33% quantiles, and the thinner second region shows 66% quantiles. See the online article for the color version of this figure.

Figure 10

Paths to Persistence as Predictors in Nested Model Comparisons



Note. Lower AIC values indicate better fit; here, we plot AICc, which implements a correction known to reduce bias (Burnham et al., 2011). "Inf" indicates the informational path, "Ont" the ontological, and "Fun" the functional; "x" indicates interactions. The red circles show the predictors included in the models, which are plotted in each row; the arrows and terms on top of the bars mark terms whose addition confers a substantial boost in predictive performance. AIC = Akaike information criterion. See the online article for the color version of this figure.

(in particular, pairwise interactions—the three-way interaction does not add meaningful predictive power). Figure 11 shows the structure of these interactions in the best performing model (which explains 32.3% of the variance in response as calculated by a measure of R^2 for mixed effects models; Nakagawa & Schielzeth, 2013).

As preregistered, we replicated this analysis both with our measure of view change and by examining the regression coefficients for the best performing models (see Supplemental Materials SMA4; Supplemental Figures A8–A10), which revealed similar patterns.[8] Taken together, these analyses answer our second guiding question: predicting how people respond to novel evidence of societal dissent requires considering all paths. The PPM, in relating mechanisms across literatures, provides the theory scaffolding this analysis.

Examining interactions across paths reveals three important points about the psychology of disagreement. First, view questioning is most likely when people perceive others as competent informants, the issue as objective, and the consequences of view change as minimal (i.e., the tip of the reddest line on the leftmost facet). The size of this "all paths blocked" effect is substantial: 26.4% of responses where participants were below-mean on all paths resulted in questioning, compared to the 10.5% for other participants (Cohen's $h = .42$). For reference, this is a similarly sized effect to receiving a "high" (>83%) vs. "low" (50%–66%) disagreement issue (Cohen's $h = .47$). Second, subjectivity moderates the effect of informational considerations: perceiving disagreeing others as competent versus incompetent leads to a ~20% difference ($M_{\text{question;informational<0}} = 23.7\%$ vs. $M_{\text{question;informational>0}} = 5.3\%$) in questioning for objective issues and only a ~5% difference for subjective issues ($M_{\text{question;informational<0}} = 15.2\%$ vs. $M_{\text{question;informational>0}} = 10.0\%$). Third, across all cases, persistence is high (even when examining cases where all paths are blocked and people underestimate dissent by 50% or more, ~60% persist). Qualitatively, the key conclusions listed here hold when we replicate these analyses with view change as the outcome (see Supplemental Materials SMA6 for details and figures).

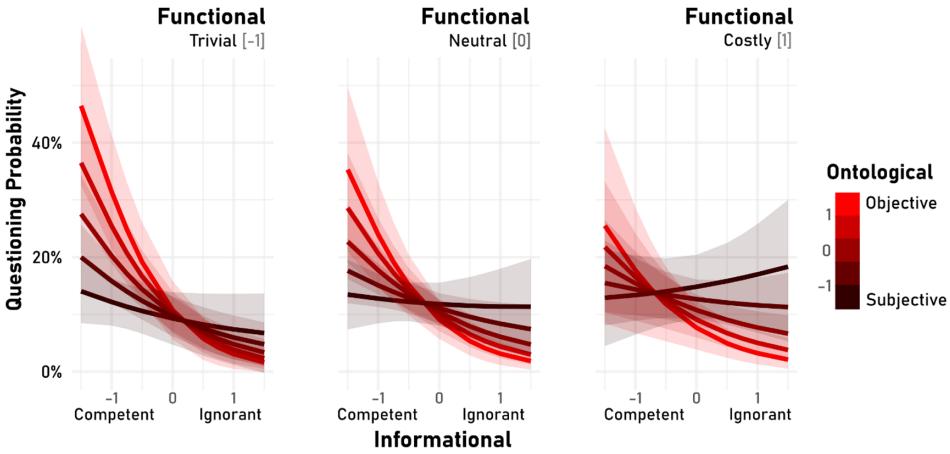
We next analyzed whether taking different paths to persistence is associated with differences in social judgments. As preregistered, we analyzed the inter-relationships between four measures of the social impact of disagreement and the paths (see Figure 12).

The paths people take to persistence had significant and varied effects on our outcomes. Perceiving disagreeing others as unreliable—that is, taking the informational path to persistence—was generally associated with negative outcomes: from a lower willingness to converse and befriend others to decreased support for the expression of dissent. The functional path showed similar effects, whereas the ontological path showed the opposite: When people persisted because they perceived issues as subjective, for instance, they were more willing to befriend and converse with disagreeing others. There were again important interactions: The ontological path blocked the negative consequences of the informational and functional paths. In other words, people could perceive disagreeing others as unreliable and still be willing to talk to them if

[8] The only qualitative difference across these analyses is that the Ontological × Functional interaction does not reach significance for the view questioning best-performing regression, but it does for the equivalent view change analysis.

Figure 11

Model Predictions for the Effects of PPM on Questioning

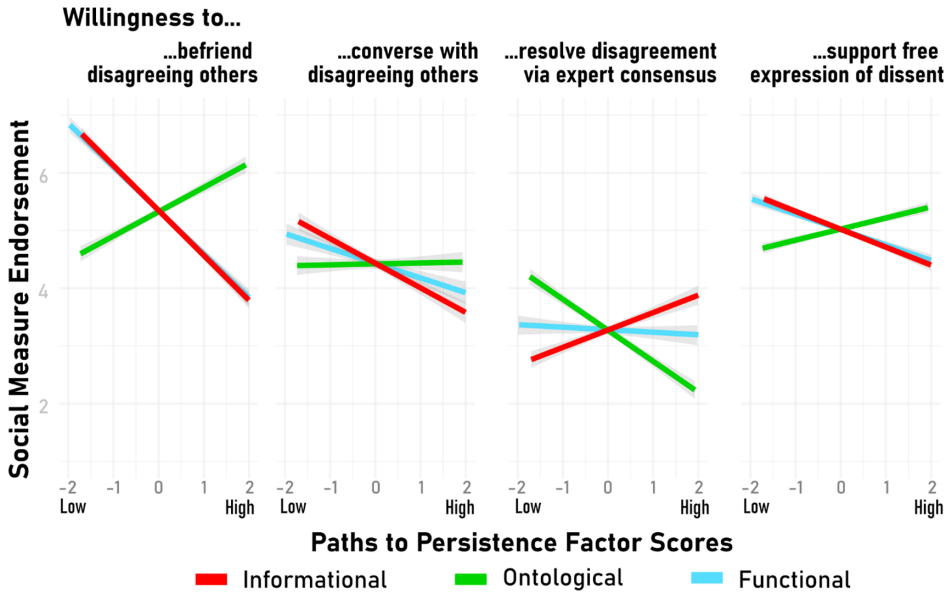


Note. Figure shows the mean predicted view change across the PPM, and model-derived 95% confidence intervals. For clarity, the axes partition the standardized factor scores: the informational path is shown continuously on the *x*-axis, the ontological in five color bins, and the functional in three facets. Note that the additional verbal labels on the axes are intended to provide intuition for the graphs—they do not comprehensively capture latent dimensions (e.g., ontological is shown as going from subjective to objective, when it also incorporates unknowability). PPM = paths to persistence model. See the online article for the color version of this figure.

they perceived the issue as subjective or unknowable (further descriptions and regression statistics are available in Supplemental Materials SMA6). However, the prosocial benefits of ontological persistence come with a trade-off: effective conflict resolution strategies—such as reliance on experts—may be less likely to be pursued when issues are seen as subjective or unknowable (an issue mirrored in debates about the possibility of moral expertise; McGrath, 2011). Taken together, these results show that the PPM passes our third criterion: It predicts important downstream consequences of dissent.

Figure 12

Relationship Between the Paths to Persistence and Social Outcomes



Note. Error bars show 95% confidence intervals. Additional plots showing interdependencies between paths is available in Supplemental Materials SMA6; Supplemental Figures A14–15. See the online article for the color version of this figure.

Limitations

This study had several limitations. First, this was an online study that used self-report measures, so the extent to which relationships observed in this data set generalize to real-world behavior is an open question (Skitka & Sargis, 2006). The severity of this limitation varies across our measures: The PPM measures require introspecting on one's beliefs, while measures of the social outcomes also require simulating social interactions, and as such should be taken with a larger grain of salt. Second, our measures were not intended to capture all aspects of the PPM, not only because we did not measure the computational path, but also because we expect future research to uncover more subpaths (as discussed in the *Ambiguous Cases and Assumptions* section) and because there were aspects of the subpaths that our measures did not capture. For instance, our measures of the informational path track whether disagreeing others are seen as being epistemically inferior relative to oneself (rather than the group agreeing with oneself). This limitation may explain why rates of questioning remain low even when our measures suggest that all paths are blocked, as there were many unmeasured subpaths participants could have taken to persistence. Third, we sampled issues on which participants in fact held a minority view. Our results may not generalize to issues for which they hold the majority view—for instance, while participants underestimated societal disagreement in our study, they may have overestimated societal disagreement if we had sampled issues for which they hold the majority view.

Despite these limitations, this study offers a proof of concept and initial support for the PPM. We find evidence that the three paths that we investigated are psychologically distinct and meaningful, insofar as they predict persistence and social consequences of persistence, with interactions across paths that show individually unique profiles. We also find that for the controversies we examined, persistence is the overwhelming response, even when participants learn that disagreement is much more prevalent than they expected. Finally, we find heterogeneity in paths to persistence not only across individuals but across issues and domains as well. These findings not only support the PPM but also lay the groundwork for future work on persistence and belief change in the face of societal disagreement.

Results of Supplementary Studies

As noted in the beginning of this section, Study 1 was the end product of many pilots and studies through which we developed and validated the PPM. Here, we provide high-level summaries of the key conclusions of each preregistered study that preceded Study 1; readers who wish to learn more are directed to our Supplemental Materials (SMB1-5).

In Supplemental Study 1 (N = 356), we elicited open-ended responses to a smaller set of 16 items sampled from the same four domains. We examined whether participants tend to persist in their views and documented the explanations they provided for their responses. Two independent coders classified explanations with high interrater reliability and found that participants typically appealed to informational explanations and sometimes ontological but that they rarely appealed to functional or computational explanations. Importantly, the coders did not identify any meaningful alternative categories that explained why participants persisted.

In Supplemental Study 2 (N = 354), we generated 11 close-ended items that corresponded to the kinds of explanations participants produced in the open-ended task and examined the factor structure of participants' responses to these items. We found that a three- or four-factor structure explained participants' judgments equally well. Beyond factors capturing the informational and ontological paths, participants' close-ended responses to the functional items captured substantial variance, but their responses to the computational items did not. We also observed significant cross-domain variation in participants' endorsement of different explanations and found—as in Study 1—that participants were most likely to question their view when all paths to persistence were blocked. A key limitation of these first two studies, however, was that we asked participants to reflect on their own estimates of societal disagreement, rather than providing them with the actual statistics.

In Supplemental Study 3 (N = 399), we addressed this limitation by replicating Supplemental Study 2 using only one item for each path while providing participants with actual public opinion statistics. We broadly replicated our prior results and found that participants' prediction errors did not play a key role in explaining persistence. However, there was another important limitation: all of the controversies we examined in this initial set split the population in half. It was possible that participants persisted merely because they were not confronted with sufficiently large disagreements. A second limitation was that we used only the view-questioning measure to operationalize persistence.

In Supplemental Study 4 (N = 812), we therefore generated an expanded set of controversies similar to that used in Study 1 and found that participants persisted even when they were confronted with very large disagreements (and that the paths predicted persistence even after taking actual disagreement and prediction error into account). Moreover, we used a four-option persist/conciliate/polarize/suspend question and found that persistence was the modal response using this alternative measure (~75% persisted). This study also had important limitations: First, the importance of possible interactions across paths became more apparent to us after examining this larger data set, and as such, we had not preregistered an analytical strategy for examining the joint effects of the paths. Second, we did not have any measures of downstream outcomes in these studies, so we did not know whether different paths to persistence were associated with different social judgments. And finally, all our prior studies were conducted with the default participant pool on Prolific, so we did not know whether the effects would replicate in a representative sample. The main study we present in this article addresses all of these limitations and is the culmination of 3 years of research on the PPM.

In sum, these studies support the conclusions drawn from Study 1 concerning the psychological reality of the paths identified by the PPM: open-ended responses produced overwhelmingly informational and ontological considerations, while close-ended responses revealed the expected three- or four-factor structures. Our supplementary studies additionally offer conceptual replications of many of our key results and suggest that our conclusions are robust to a variety of minor methodological variations.

Part 4: General Discussion

Is abortion morally acceptable?

Do we burn fossil fuels more than we should?

Should we mandate vaccinations in epidemics?

With policy following public opinion in democracies, answers to life-and-death questions like these end up shaping our societies. And we often have answers to them—answers that we confidently sustain in the face of controversy. You may have found yourself holding beliefs about the issues above with confidence, for example, even when hundreds of millions disagree.

In this article, we have developed a model of how such belief persistence operates from a psychological perspective. We first defined disagreement and persistence. Then, in Part 2, we offered a comprehensive taxonomy of explanations for persistence in the form of four "paths." In a nutshell, if people (a) perceive disagreeing others to be epistemically inferior, (b) reject the possibility of evaluating the shared "truth" of an issue, (c) are swayed by the costs and benefits of holding particular beliefs, or (d) fail to represent or reason about disagreement appropriately, they can persist in their belief amid disagreement. In Part 3, we leveraged these insights to conduct a comprehensive empirical examination of how the paths influence people's tendency to persist.

In this final section, we first return to our guiding puzzle. We then consider key theoretical, practical, and normative insights revealed by the PPM and discuss fruitful directions for future research.

Resolving the Puzzle of Persistence

Why is persistence so common, and when can disagreement make us question our views instead? There is an important asymmetry between persisting on the one hand and conciliating or suspending on the other that offers a simple solution to the puzzling prevalence of persistence. As we have seen, one path can be sufficient to persist—questioning is therefore most likely when all paths are blocked. For example, Theo can persist in his beliefs about GMOs on purely informational grounds. On the other hand, for Theo to question his beliefs about GMOs, he would ideally both become more intellectually humble and also (a) believe that the healthiness of GMOs is an objective and knowable fact, (b) estimate that functional costs of alternative views do not override other considerations, and (c) invest cognitive resources to reconsider his views about GMOs.

Beyond our empirical results, past literature has also shown that these paths are readily endorsed: partisans assume superior evidence and intelligence over their political opponents (Hartman et al., 2022), resort to subjective framings of key issues when challenged (Friesen et al., 2015), are driven by strong social motives to maintain political views (Golman et al., 2016), and find their attention spread thin across many complex and pressing issues (Williams, 2018). To the extent these paths are mutually reinforcing, rather than independent, the interactions among paths can potentially explain not only why persistence is common in such cases, but also why it is so entrenched.

Of course, questioning will be optimal in some circumstances. For trivial issues on which people do not have special expertise or social commitments, for instance, we may expect questioning to be common. Even important controversies may be widely questioned in the right contexts. For instance, in environments where critical thinking is actively rewarded, structured engagement with disagreeing others reveals the limitations of one's own understanding, and people are jointly engaged in trying to reach an objectively justifiable conclusion, views may be more pliable amid dissent.

Consider the "America in One Room" study, where a nationally representative sample of 500 adults was brought together to deliberate on five major controversies over a few days. Participants were placed in small groups, where they had to formulate group questions for balanced panels of competing experts, with the explicit aim of reaching accurate judgments (Fishkin et al., 2021). The study had depolarizing effects on controversial attitudes—that is, it allowed people to move beyond persistence. How do we explain the efficacy of this intervention? The small-group discussions plausibly allowed people to calibrate their inferences of how much they (vs. disagreeing others) know, blocking the informational path; the discussions focused on objective policy proposals, blocking the ontological path; the study moved people from their normal social contexts into one in which they had to interact with disagreeing others for an extended period, blocking many functional considerations; and the study design gave people ample time for deliberation, blocking many computational considerations. Though America in One Room seems like an exceptional intervention, note how higher education aims to foster such an environment for people across the globe (e.g., by fostering critical thinking and relocating students out of their normal social contexts). Accordingly, courses focused on controversial issues can allow people to question their views: For example, a college moral philosophy course can cause students' views to flip on important moral controversies, such as the ethics of immigration, slavery reparations, and meat-eating (Oktar et al., 2023). The paths thus both explain why persistence is common for key controversies and when people are most likely to question their views instead.

Having addressed our guiding puzzle, we now turn to implications.

Theoretical Implications

The mechanisms underlying disagreement are rich, intertwined, and variable—in a word, complex. Here, we explain why this complexity can cause typical theorizing about disagreement to be misleading, predictively weak, and even harmful. We then describe how the PPM can help scholars accommodate this complexity.

Historically and presently, much psychological research on disagreement revolves around establishing whether particular effects exist by examining a few issues—for instance, whether disagreements induce perceptions of bias (Kennedy & Pronin, 2008) or unintelligence (Hartman et al., 2022). However, such marginal (i.e., direct) effects of disagreement can be unstable and misleading given the large number of factors likely to moderate or otherwise influence effects.

For instance, if we had restricted the stimulus space in our main study to disagreements on issues typically seen as subjective and important and not investigated the role of interactions, we could have failed to find an effect of informational factors—despite their clearly playing a dominant role in the mechanisms of persistence. This misleading result would be a direct consequence of merely examining marginal effects and not sampling stimuli in a representative manner (Yarkoni, 2022). Thus, whether an effect relating to disagreement exists is often not a helpful question—instead, we should ask how and why different factors *jointly* influence responses to disagreement, and the PPM enables us to do so in a theory-driven manner.

The complexity of the mechanisms of persistence also complicates inverse inferences: from the tendency to persist to explanations

for that persistence. Without recognizing a potential role for all factors in the PPM, inverse inferences can lead to harmful misattributions. For instance, consider work on the "rigidity of the right" hypothesis (RRH), according to which conservatives are more dogmatic, worse at adapting to novel circumstances, and generally more cognitively rigid than liberals (for a review, see Zmigrod, 2020). Part of the evidence behind the RRH comes from studies investigating how much conservatives and liberals update their views in the face of disconfirmatory empirical evidence (Costello et al., 2023). Does such unresponsiveness to informational interventions mean that conservatives are more rigid or dogmatic in general?

Not necessarily: If conservatives were highly sensitive to ontological considerations, such as the subjectivity of issues, and liberals were instead highly sensitive to informational considerations, we would expect differences in the efficacy of informational interventions—not because one group is less rigid, but because we happened to target the right path for that group. Establishing rigidity would require comparing responses to a battery of interventions that cover all paths. Consistent with this concern, a recent adversarial collaboration reveals highly complex variation across issues in whether conservatives update more or less than liberals do (Bowes et al., 2023).

Importantly, our goal here is not to evaluate decades of research on rigidity. Instead, we intend our discussion of RRH to serve as an example of the general principle that establishing the marginal effects of disagreement—whether informational, ontological, or functional—can be misleading, leading to groups being labelled dogmatic or inflexible on the basis of potentially insufficient evidence.

Critically, this complexity is not insurmountable, and the PPM helps point us to fruitful ways forward. The flexibility of our analysis allows us to consider much richer hypotheses than alternative frameworks can accommodate. For instance, explaining persistence solely through motivated reasoning would obscure the richness of informational considerations (Kunda, 1990); solely Bayesian explanations would miss out on the functional (Gershman, 2019); and accounts that integrate practical and epistemic value, such as value-based belief (Bromberg-Martin & Sharot, 2020), would miss out on the ontological relevance of others' views to our own. The PPM outlines how these critical components come together to form the mechanisms of persistence.

Empirical Implications

Our theoretical analysis highlights new questions and opportunities for future empirical research. In particular, the integrated PPM has direct implications for the design of interventions aimed toward changing beliefs about important issues.

As Ross and Anderson (1982) remarked, "beliefs are remarkably resilient in the face of empirical challenges that seem logically devastating." Accumulating evidence since then has shown that interventions on controversial beliefs and attitudes tend to have small effects across domains, intervention types, and measures (Albarracín & Shavitt, 2018; van Stekelenburg et al., 2022). These facts seem to establish a pessimistic baseline for the potential efficacy of persistence-reducing interventions. Indeed, prominent scholars in the behavioral sciences have begun arguing for a shift away from individual-level interventions due to their inefficacy in important domains (Chater & Loewenstein, 2023).

But why do typical belief-change interventions fail? A common explanation is that people's views on important issues are simply too robust: Haidt (2001), for instance, writes that moral judgments will change "primarily in cases in which the initial intuition is weak." The PPM suggests a complementary but alternative explanation: Belief change interventions have the best chances of succeeding when they address the *sources* of persistence in a *targeted* manner. Much as precision medicine aims to further the efficacy and efficiency of health care interventions by tailoring the selection of drugs, dosage, timing, and additional treatments, *precision interventions* would optimally tailor belief-change interventions to the specific set of mechanisms driving individual beliefs.

Yet typical belief-change interventions are more akin to fast fashion than tailored interventions. The vast majority are epistemic interventions that aim to be cheap and scalable (Bar-Tal & Hameiri, 2020): For example, providing factual corrections (Brashier et al., 2021), sharing relevant arguments (Jolley & Douglas, 2017), or communicating expert consensus (van Stekelenburg et al., 2022). Other paths have received much less attention—we are not aware of any work on ontological interventions for changing beliefs, for instance, except for some related work in educational psychology (Klopp & Stark, 2022). Relatedly, the vast majority of interventions examine the effects of just one intervention: as pointed out in a review of misinformation research, "most research to date has considered each approach separately and more research is required to test synergies between these strategies" (Ecker et al., 2022, p. 18).

The PPM explains why Ecker et al.'s call is of crucial importance. Persistence is driven by multiple interacting mechanisms, with potential heterogeneity in mechanisms across issues and across the population. We should therefore avoid drawing premature conclusions (e.g., that beliefs are too robust to change) without examining a broader set of intervention strategies. Much as conservatives' views may be less rigid than previous research suggests, tailored interventions may generally be more effective at fostering scientifically informed beliefs than past interventions indicate. Consider, for instance, a case in which a third of a sample maintain a harmful unscientific belief (e.g., that vaccines cause autism) due to informational reasons (e.g., believing others have worse evidence), a third persist due to functional reasons (e.g., identity-based commitments), and a third due to a combination of both. We should expect purely informational or functional interventions—such as providing evidence that disagreeing others have expertise (Ranney & Clark, 2016) or that there are members of one's in-group with the opposing view (W. Wood et al., 1994)—to have moderate-sized effects for a third of the sample, which would average out to weak effects across the sample; a tailored intervention could have moderate-sized effects overall.

In sum, when designing interventions to address belief persistence, we need to pay attention to which paths underlie particular cases and aim to address all of them.

Normative Implications

In the preceding sections, we have presented an extensive analysis of the descriptive questions relating to disagreement. Here, we outline some of the key normative questions that emerge from this discussion. These questions are important for psychologists to be aware of, because how individuals ought to react to disagreement influences how researchers should try to influence individuals'

beliefs through interventions and which psychological questions should be pursued with greater urgency and attention. Our aim is not to answer these questions but rather to highlight them.

Perhaps the foundational question here is whether it is good for people to persist. At the level of analysis of the individual, the answer can often be "yes," as the PPM outlines a broad set of psychological considerations that can justify persistence. But the question of whether it is good for people to persist is much broader than the individual—is it *societally* optimal for individuals to persist? Scholars across disciplines have long noted that individually optimal behavior does not necessarily result in societally optimal outcomes and vice versa (Ostrom, 1999). In the case of disagreement, persistence plays a particularly important role in enabling transient diversity of opinion across key issues, which can facilitate effective problem-solving (Hong & Page, 2004; Smaldino et al., 2023; Zollman, 2010). On the other hand, whether such diversity is productive depends on more complex considerations. For example, ethically, we may not want diversity on core human values, such as freedom from slavery, and epistemologically, we may want diversity on scientific questions to be proportional to the state of current evidence (Kitcher, 1990). Moreover, persistence may serve as the cognitive foundation for entrenched societal-level disagreements and polarization (Osmundsen et al., 2021). It is likely that persistence has both beneficial and harmful societal consequences—so a more tractable normative question might be whether there are better or worse ways to persist.

For example, different paths may lead to differentially truth-promoting or prosocial behavior. Some paths seem inferior on both counts: Attributions of bias or dishonesty may be particularly disabling of truth-promoting deliberation and community-building interaction. Supporting this claim, disagreement-induced perceptions of bias lower the perceived effectiveness of communication and lead to more aggressive interactions (Kennedy & Pronin, 2008). On the other hand, some paths, such as attributions of subjectivity, may be truth-promoting both individually and societally if they enable the formation of social relationships that allow evidence to be shared over time. Our data support this possibility—persistence on the basis of ontological subjectivity is associated with higher willingness for friendship and conversations with disagreeing others—though our data also suggest that subjectivity may lower willingness to pursue effective conflict resolution strategies, such as reliance on expert consensus, complicating the normative analysis.

Future Directions

We hope that the PPM will motivate deep and systematic inquiry into the mechanisms of persistence. In particular, we hope that scholars pursue three lines of inquiry.

First, the field should take up the challenge of developing precision interventions that target the particular paths that drive individual beliefs. Recent work has shown that utilizing the flexible, generative capacity of large language models might be a fruitful avenue for pursuing this strategy—models can be fine-tuned to target the particular set of paths supporting individual beliefs, allowing for effective interventions that promote view questioning (Costello et al., 2024). This strategy can allow researchers to overcome pessimistic (and potentially premature) conclusions about the inefficacy of belief-change interventions (Chater & Loewenstein, 2023). Many important questions lie ahead for research on this front, including whether all causes of persistence can be addressed through large language models—identity-based persistence, for instance, may not be effectively addressed without engaging with group-level processes (Hogg et al., 2017; Van Bavel & Pereira, 2018).

Second, in designing studies intended to generate generalizable conclusions about the mechanisms of persistence, belief change, persuasion, and related phenomena, future research should aim to consider multiple paths in parallel, which will typically require sampling a representative sample of stimuli and participants, as some mechanisms (e.g., ontological inferences) will manifest themselves for some issues (e.g., religious controversies) more so than others (e.g., scientific controversies), and potentially with heterogeneity across populations. Beyond outlining theoretically relevant considerations through the PPM, our empirical approach demonstrates how such studies can be implemented, and the insights that can be gleaned from comprehensive sampling of stimuli.

Finally, when it comes to the next steps on the PPM, we see four key avenues for progress. First, research should examine individual and cultural differences in the paths people take. For instance, does variation in cognitive style (Trippas et al., 2015), identity strength (Cohen, 2012), cultural context (Markus & Kitayama, 1991), or ideological commitment (Gastil et al., 2008) moderate how people persist—in terms of which paths they pursue, and how those paths interact to produce persistence (Kroupin et al., 2025)? Such variation is important to understand when developing globally scalable interventions for belief change—especially given existing evidence of cross-cultural variation in sensitivity to dissent (Bond & Smith, 1996) and agreeableness as a trait (Wilmot & Ones, 2022). Second, our empirical investigation was limited to the first three paths—but our theoretical discussion exposed the deeply important role of computational constraints in driving persistence. Though other theoretical research has also examined computational limitations and belief change (Pothos et al., 2021), we are not aware of any corresponding empirical research. Future research can take inspiration from the meta-reasoning literature in designing studies that investigate the influence of constraints on reasoning and representations (Lieder & Griffiths, 2017). Third, our analysis began with four possible responses to disagreement (persistence, conciliation, polarization, and suspension), and focused on the mechanisms driving persistence. An important avenue for theoretical development is integrating mechanisms that drive these distinct responses under one framework. This will require reconciling existing perspectives on polarization (e.g., Jern et al., 2014), conciliation (Sharot et al., 2023), and suspension (Kruglanski, 2004) with the PPM both in terms of mechanisms (e.g., are there additional paths that uniquely lead to the other responses?) and the responses themselves (e.g., does persistence yield to the other responses over time?). And finally, our development of the PPM was specifically intended to explain persistence amid societal disagreement, and our empirical studies test the PPM in the context of public opinion. However, disagreement as a phenomenon is much broader than the societal case: It includes conversational disagreements between two people (Schroeder et al., 2017), between humans and artificial agents (Costello et al., 2024), within teams (Hong & Page, 2004), and across groups (Lackey, 2021). Future research should empirically examine whether the PPM can also shed light on disagreements in such contexts, and theoretically extend the model to account for any additional mechanisms.

Conclusion

In this article, we developed and tested a model of how individuals persist in their beliefs amid societal controversy. Starting with a definition of disagreement, we situated persistence among other possible responses and explained how it is distinct from other forms of resilience to disconfirmatory evidence. We then described the PPM. We explained how each of four distinct paths (informational, ontological, functional, and computational) can individually drive persistence, and then introduced a study that empirically demonstrated the predictive power of the joint effects of the first three paths. We finally considered theoretical, empirical, and normative implications; from why typical theorizing about disagreement can result in misleading conclusions, to how empirical research needs to evolve to precisely address the sources of persistence, and whether there are better or worse ways to persist. We hope that the PPM will guide much-needed empirical inquiry into the psychology of persistence, and thus set the stage for the development of effective interventions that bridge rifts in our societies.

References

Aboody, R., Yousif, S. R., Sheskin, M., & Keil, F. C. (2022). Says who? Children consider informants' sources when deciding whom to believe. *Journal of Experimental Psychology: General*, *151*(10), 2481–2493. https://doi.org/10.1037/xge0001198

Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review*, *96*(2), 358–372. https://doi.org/10.1037/0033-295X.96.2.358

Albarracín, D., & Shavitt, S. (2018). Attitudes and attitude change. *Annual Review of Psychology*, *69*(1), 299–327. https://doi.org/10.1146/annurev-psych-122216-011911

Altay, S., Majima, Y., & Mercier, H. (2023). Happy thoughts: The role of communion in accepting and sharing (mis)beliefs. *British Journal of Social Psychology*, *62*(4), 1672–1692. https://doi.org/10.1111/bjso.12650

Angouri, J., & Locher, M. A. (2012). Theorising disagreement. *Journal of Pragmatics*, *44*(12), 1549–1553. https://doi.org/10.1016/j.pragma.2012.06.011

Austen-Smith, D., & Banks, J. S. (1996). Information aggregation, rationality, and the condorcet jury theorem. *The American Political Science Review*, *90*(1), 34–45. https://doi.org/10.2307/2082796

Axelrod, R. (1997). The dissemination of culture: A model with local convergence and global polarization. *Journal of Conflict Resolution*, *41*(2), 203–226. https://doi.org/10.1177/0022002797041002001

Ayars, A., & Nichols, S. (2020). Rational learners and metaethics: Universalism, relativism, and evidence from consensus. *Mind & Language*, *35*(1), 67–89. https://doi.org/10.1111/mila.12232

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*(2), 122–147. https://doi.org/10.1037/0003-066X.37.2.122

Bar-Tal, D., & Hameiri, B. (2020). Interventions to change well-anchored attitudes in the context of intergroup conflict. *Social and Personality Psychology Compass*, *14*(7), Article e12534. https://doi.org/10.1111/spc3.12534

Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, *68*(3), 255–278. https://doi.org/10.1016/j.jml.2012.11.001

Bénabou, R., & Tirole, J. (2016). Mindful economics: The production, consumption, and value of beliefs. *The Journal of Economic Perspectives*, *30*(3), 141–164. https://doi.org/10.1257/jep.30.3.141

Bendaña, J., & Mandelbaum, E. (2021). The fragmentation of belief. In C. Borgoni, D. Kindermann, & A. Onofri (Eds.), *The fragmented mind* (pp. 78–107). Oxford University Press. https://doi.org/10.1093/oso/9780198850670.003.0004

Bikhchandani, S., Hirshleifer, D., & Welch, I. (1998). Learning from the behavior of others: Conformity, fads, and informational cascades. *The Journal of Economic Perspectives*, *12*(3), 151–170. https://doi.org/10.1257/jep.12.3.151

Blake, R. R., Helson, H., & Mouton, J. S. (1957). The generality of conformity behavior as a function of factual anchorage, difficulty of task, and amount of social pressure. *Journal of Personality*, *25*(3), 294–305. https://doi.org/10.1111/j.1467-6494.1957.tb01528.x

Blanchard, T., Lombrozo, T., & Nichols, S. (2018). Bayesian Occam's razor is a razor of the people. *Cognitive Science*, *42*(4), 1345–1359. https://doi.org/10.1111/cogs.12573

Bochner, S., & Insko, C. A. (1966). Communicator discrepancy, source credibility, and opinion change. *Journal of Personality and Social Psychology*, *4*(6), 614–621. https://doi.org/10.1037/h0021192

Bond, R., & Smith, P. B. (1996). Culture and conformity: A meta-analysis of studies using Asch's (1952b, 1956) line judgment task. *Psychological Bulletin*, *119*(1), 111–137. https://doi.org/10.1037/0033-2909.119.1.111

Bondy, P. (2021). The epistemic norm of inference and non-epistemic reasons for belief. *Synthese*, *198*(2), 1761–1781. https://doi.org/10.1007/s11229-019-02163-3

Bovens, L., & Hartmann, S. (2003). *Bayesian epistemology* (S. Hartmann, Ed.). Oxford University Press.

Bowes, S. M., Costello, T. H., & Tasimi, A. (2023). The conspiratorial mind: A meta-analytic review of motivational and personological correlates. *Psychological Bulletin*, *149*(5–6), 259–293. https://doi.org/10.1037/bul0000392

Box, G. E. P. (1976). Science and statistics. *Journal of the American Statistical Association*, *71*(356), 791–799. https://doi.org/10.1080/01621459.1976.10480949

Brandt, M. J. (2022). Measuring the belief system of a person. *Journal of Personality and Social Psychology*, *123*(4), 830–853. https://doi.org/10.1037/pspp0000416

Brashier, N. M., Pennycook, G., Berinsky, A. J., & Rand, D. G. (2021). Timing matters when correcting fake news. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(5), Article e2020043118. https://doi.org/10.1073/pnas.2020043118

Breakwell, G. M. (2015). *Coping with threatened identities*. Psychology Press. https://doi.org/10.4324/9781315733913

Bromberg-Martin, E. S., & Sharot, T. (2020). The value of beliefs. *Neuron*, *106*(4), 561–565. https://doi.org/10.1016/j.neuron.2020.05.001

Brown, G. D. A., Lewandowsky, S., & Huang, Z. (2022). Social sampling and expressed attitudes: Authenticity preference and social extremeness aversion lead to social norm effects and polarization. *Psychological Review*, *129*(1), 18–48. https://doi.org/10.1037/rev0000342

Burnham, K. P., & Anderson, D. R. (Eds.). (2004). *Model selection and multimodel inference*. Springer. https://doi.org/10.1007/b97636

Burnham, K. P., Anderson, D. R., & Huyvaert, K. P. (2011). AIC model selection and multimodel inference in behavioral ecology: Some background, observations, and comparisons. *Behavioral Ecology and Sociobiology*, *65*(1), 23–35. https://doi.org/10.1007/s00265-010-1029-6

Carlos, R. F., Sheagley, G., & Taylor, K. L. (2023). Tolerance for the Free Speech of Outgroup Partisans. *PS, Political Science & Politics*, *56*(2), 240–244. https://doi.org/10.1017/S1049096522001202

Carothers, T., & O'Donohue, A. (Eds.). (2019). *Democracies divided: The global challenge of political polarization*. The Brookings Institution.

Carter, J. A. (2018). Meta-epistemic defeat. *Synthese*, *195*(7), 2877–2896. https://doi.org/10.1007/s11229-016-1187-9

Cato Institue. (2020, July 22). *Poll: 62% of Americans say they have political views they're afraid to share*. https://www.cato.org/survey-reports/poll-62-americans-say-they-have-political-views-theyre-afraid-share

Chater, N. (2018). *Mind is flat: The remarkable shallowness of the improvising brain*. Yale University Press.

Chater, N., & Loewenstein, G. (2023). The i-frame and the s-frame: How focusing on individual-level solutions has led behavioral public policy astray. *Behavioral and Brain Sciences*, *46*, Article e147. https://doi.org/10.1017/S0140525X22002023

Cheek, N. N., Blackman, S. F., & Pronin, E. (2021). Seeing the subjective as objective: People perceive the taste of those they disagree with as biased and wrong. *Journal of Behavioral Decision Making*, *34*(2), 167–182. https://doi.org/10.1002/bdm.2201

Chlup, D. T., & Collins, T. E. (2010). Breaking the ice: Using ice-breakers and re-energizers with adult learners. *Adult Learning*, *21*(3–4), 34–39. https://doi.org/10.1177/104515951002100305

Christensen, D. (2007). Epistemology of disagreement: The good news. *The Philosophical Review*, *116*(2), 187–217. https://doi.org/10.1215/00318108-2006-035

Christensen, D. (2010). Higher-order evidence. *Philosophy and Phenomenological Research*, *81*(1), 185–215. https://doi.org/10.1111/j.1933-1592.2010.00366.x

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, *55*(1), 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Cinelli, M., De Francisci Morales, G., Galeazzi, A., Quattrociocchi, W., & Starnini, M. (2021). The echo chamber effect on social media. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(9), Article e2023301118. https://doi.org/10.1073/pnas.2023301118

Cohen, G. L. (2003). Party over policy: The dominating impact of group influence on political beliefs. *Journal of Personality and Social Psychology*, *85*(5), 808–822. https://doi.org/10.1037/0022-3514.85.5.808

Cohen, G. L. (2012). Identity, belief, and bias. In J. Hanson (Ed.), *Ideology, psychology, and law* (pp. 385–403). Oxford Academic. https://doi.org/10.1093/acprof:Oso/9780199737512.003.0015

Cohen, G. L., Aronson, J., & Steele, C. M. (2000). When beliefs yield to evidence: Reducing biased evaluation by affirming the self. *Personality and Social Psychology Bulletin*, *26*(9), 1151–1164. https://doi.org/10.1177/01461672002611011

Connor Desai, S., Xie, B., & Hayes, B. K. (2022). Getting to the source of the illusion of consensus. *Cognition*, *223*, Article 105023. https://doi.org/10.1016/j.cognition.2022.105023

Converse, P. E. (2006). The nature of belief systems in mass publics (1964). *Critical Review*, *18*(1–3), 1–74. https://doi.org/10.1080/08913810608443650

Cook, J., & Lewandowsky, S. (2016). Rational irrationality: Modeling climate change belief polarization using Bayesian networks. *Topics in Cognitive Science*, *8*(1), 160–179. https://doi.org/10.1111/tops.12186

Cooper, J. (2007). *Cognitive dissonance: Fifty years of a classic theory*. SAGE Publications. https://doi.org/10.4135/9781446214282

Costello, T. H., Bowes, S. M., Baldwin, M. W., Malka, A., & Tasimi, A. (2023). Revisiting the rigidity-of-the-right hypothesis: A meta-analytic review. *Journal of Personality and Social Psychology*, *124*(5), 1025–1052. https://doi.org/10.1037/pspp0000446

Costello, T. H., Pennycook, G., & Rand, D. (2024). *Durably reducing conspiracy beliefs through dialogues with AI*. https://doi.org/10.31234/osf.io/xcwdn

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, *11*(6), 671–684. https://doi.org/10.1016/S0022-5371(72)80001-X

Cruz, H. D. (2020). Believing to belong: Addressing the novice-expert problem in polarized scientific communication. *Social Epistemology*, *34*(5), 440–452. https://doi.org/10.1080/02691728.2020.1739778

Cunningham, V. (2021, January 6). The rioters in the senate chamber. *The New Yorker*. https://www.newyorker.com/culture/annals-of-appearances/the-rioters-in-the-senate-chamber

Cusimano, C., & Lombrozo, T. (2023). People recognize and condone their own morally motivated reasoning. *Cognition*, *234*, Article 105379. https://doi.org/10.1016/j.cognition.2023.105379

Dai, H., Chan, C., & Mogilner, C. (2020). People rely less on consumer reviews for experiential than material purchases. *The Journal of Consumer Research*, *46*(6), 1052–1075. https://doi.org/10.1093/jcr/ucz042

Dalege, J., Galesic, M., & Olsson, H. (2025). Networks of beliefs: An integrative theory of individual- and social-level belief dynamics. *Psychological Review*, *132*(2), 253–290. https://doi.org/10.1037/rev0000494

Davoodi, T., & Lombrozo, T. (2022a). Explaining the existential: Scientific and religious explanations play different functional roles. *Journal of Experimental Psychology: General*, *151*(5), 1199–1218. https://doi.org/10.1037/xge0001129

Davoodi, T., & Lombrozo, T. (2022b). Varieties of ignorance: Mystery and the unknown in science and religion. *Cognitive Science*, *46*(4), Article e13129. https://doi.org/10.1111/cogs.13129

Dawkins, R. (1989, April 9). In short: Nonfiction. *The New York Times*. https://www.nytimes.com/1989/04/09/books/in-short-nonfiction.html

DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology*, *70*(5), 979–995. https://doi.org/10.1037/0022-3514.70.5.979

Dietrich, F., & Spiekermann, K. (2023). Jury theorems. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy* (pp. 1–43). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/spr2023/entries/jury-theorems/

Dinas, E. (2014). Why does the apple fall far from the tree? How early political socialization prompts parent–child dissimilarity. *British Journal of Political Science*, *44*(4), 827–852. https://doi.org/10.1017/S0007123413000033

Dion, K. L. (2003). Prejudice, racism, and discrimination. In T. Millon & M. J. Lerner (Eds.), *Handbook of psychology, Vol. 5*: *Personality and social psychology* (pp. 507–536). Wiley. https://doi.org/10.1002/0471264385.wei0521

Dorst, K. (2023). Rational polarization. *Philosophical Review*, *132*(3), 355–458. https://doi.org/10.1215/00318108-10469499

Duck, J. M., & Mullin, B.-A. (1995). The perceived impact of the mass media: Reconsidering the third person effect. *European Journal of Social Psychology*, *25*(1), 77–93. https://doi.org/10.1002/ejsp.2420250107

Ecker, U. K. H., Lewandowsky, S., Cook, J., Schmid, P., Fazio, L. K., Brashier, N., Kendeou, P., Vraga, E. K., & Amazeen, M. A. (2022). The psychological drivers of misinformation belief and its resistance to correction. *Nature Reviews Psychology*, *1*(1), 13–29. https://doi.org/10.1038/s44159-021-00006-y

Egan, A. (2010). Disputing about taste. In R. Feldman & T. A. Warfield (Eds.), *Disagreement* (pp. 247–286). Oxford University Press. https://doi.org/10.1093/acprof:Oso/9780199226078.003.0011

Elder, E. M., & O'brian, N. A. (2022). Social groups as the source of political belief systems: Fresh evidence on an old theory. *The American Political Science Review*, *116*(4), 1407–1424. https://doi.org/10.1017/S0003055422000326

Epley, N., & Gilovich, T. (2016). The mechanics of motivated reasoning. *The Journal of Economic Perspectives*, *30*(3), 133–140. https://doi.org/10.1257/jep.30.3.133

Epstein, S. (1973). The self-concept revisited: Or a theory of a theory. *American Psychologist*, *28*(5), 404–416. https://doi.org/10.1037/h0034679

Fage-Butler, A., Ledderer, L., & Nielsen, K. H. (2022). Public trust and mistrust of climate science: A meta-narrative review. *Public Understanding of Science*, *31*(7), 832–846. https://doi.org/10.1177/09636625221110028

Feldman, R. (2007). Epistemological puzzles about disagreement. In S. Heatherington (Ed.), *Epistemological futures* (pp. 216–236). Oxford University Press.

Fields, J. M., & Schuman, H. (1976). Public beliefs about the beliefs of the public. *Public Opinion Quarterly*, *40*(4), 427–448. https://doi.org/10.1086/268330

Fishkin, J., Siu, A., Diamond, L., & Bradburn, N. (2021). Is deliberation an antidote to extreme partisan polarization? Reflections on "America in one

room". *The American Political Science Review*, *115*(4), 1464–1481. https://doi.org/10.1017/S0003055421000642

Fiske, S. T., Cuddy, A. J. C., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology*, *82*(6), 878–902. https://doi.org/10.1037/0022-3514.82.6.878

Flache, A., Mäs, M., Feliciani, T., Chattoe-Brown, E., Deffuant, G., Huet, S., & Lorenz, J. (2017). Models of social influence: Towards the next frontiers. *Journal of Artificial Societies and Social Simulation*, *20*(4), Article 2. https://doi.org/10.18564/jasss.3521

Frances, B. (2014). *Disagreement* (1st ed.). Polity.

Frances, B., & Matheson, J. (2019). Disagreement. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (pp. 1–29). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/win2019/entries/disagreement/

Frantz, C. M. (2006). I am being fair: The bias blind spot as a stumbling block to seeing both sides. *Basic and Applied Social Psychology*, *28*(2), 157–167. https://doi.org/10.1207/s15324834basp2802_5

Friesen, J. P., Campbell, T. H., & Kay, A. C. (2015). The psychological advantage of unfalsifiability: The appeal of untestable religious and political ideologies. *Journal of Personality and Social Psychology*, *108*(3), 515–529. https://doi.org/10.1037/pspp0000018

Gastil, J., Black, L., & Moscovitz, K. (2008). Ideology, attitude change, and deliberation in small face-to-face groups. *Political Communication*, *25*(1), 23–46. https://doi.org/10.1080/10584600701807836

Gershman, S. J. (2019). How to never be wrong. *Psychonomic Bulletin & Review*, *26*(1), 13–28. https://doi.org/10.3758/s13423-018-1488-8

Gollwitzer, A., & Oettingen, G. (2019). Paradoxical knowing: A shortcut to knowledge and its antisocial correlates. *Social Psychology*, *50*(3), 145–161. https://doi.org/10.1027/1864-9335/a000368

Golman, R., Loewenstein, G., Moene, K. O., & Zarri, L. (2016). The preference for belief consonance. *The Journal of Economic Perspectives*, *30*(3), 165–188. https://doi.org/10.1257/jep.30.3.165

Goodwin, G. P., & Darley, J. M. (2008). The psychology of meta-ethics: Exploring objectivism. *Cognition*, *106*(3), 1339–1366. https://doi.org/10.1016/j.cognition.2007.06.007

Goodwin, G. P., & Darley, J. M. (2012). Why are some moral beliefs perceived to be more objective than others? *Journal of Experimental Social Psychology*, *48*(1), 250–256. https://doi.org/10.1016/j.jesp.2011.08.006

Gottlieb, S., & Lombrozo, T. (2018). Can science explain the human mind? Intuitive judgments about the limits of science. *Psychological Science*, *29*(1), 121–130. https://doi.org/10.1177/0956797617722609

Griffiths, T. L. (2020). Understanding human intelligence through human limitations. *Trends in Cognitive Sciences*, *24*(11), 873–883. https://doi.org/10.1016/j.tics.2020.09.001

Hafer, C., & Sutton, R. (2016). Belief in a just world. In C. Sabbagh, & M. Schmitt (Eds.), *Handbook of social justice theory and research* (pp. 145–160). Springer. https://doi.org/10.1007/978-1-4939-3216-0_8

Hahn, U. (2024). Individuals, collectives, and individuals in collectives: The ineliminable role of dependence. *Perspectives on Psychological Science*, *19*(2), 418–431. https://doi.org/10.1177/17456916231198479

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, *108*(4), 814–834. https://doi.org/10.1037/0033-295X.108.4.814

Hájek, A. (2023). Interpretations of probability. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy* (Winter 2023 edition). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/win2023/entries/probability-interpret/

Hardwig, J. (1985). Epistemic dependence. *The Journal of Philosophy*, *82*(7), 335–349. https://doi.org/10.2307/2026523

Harmon-Jones, E., & Mills, J. (1999). An introduction to cognitive dissonance theory and an overview of current perspectives on the theory. In E. Harmon-Jones & J. Mills (Eds.), *Cognitive dissonance: Progress on a pivotal theory in social psychology* (pp. 3–21). American Psychological Association. https://doi.org/10.1037/10318-001

Harris, P. L. (2012). *Trusting what you're told: How children learn from others*. Harvard University Press.

Harris, P. L., Koenig, M. A., Corriveau, K. H., & Jaswal, V. K. (2018). Cognitive foundations of learning from testimony. *Annual Review of Psychology*, *69*(1), 251–273. https://doi.org/10.1146/annurev-psych-122216-011710

Hartman, R., Hester, N., & Gray, K. (2022). People see political opponents as more stupid than evil. *Personality and Social Psychology Bulletin*, *49*(7), 1014–1027. https://doi.org/10.1177/01461672221089451

Heiphetz, L., Landers, C. L., & Van Leeuwen, N. (2021). Does think mean the same thing as believe? Linguistic insights into religious cognition. *Psychology of Religion and Spirituality*, *13*(3), 287–297. https://doi.org/10.1037/rel0000238

Heiphetz, L., & Young, L. L. (2017). Can only one person be right? The development of objectivism and social preferences regarding widely shared and controversial moral beliefs. *Cognition*, *167*, 78–90. https://doi.org/10.1016/j.cognition.2016.05.014

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, *33*(2–3), 61–83. https://doi.org/10.1017/S0140525X0999152X

Hetherington, M. J., & Rudolph, T. J. (2015). Why Washington won't work: Polarization, political trust, and the governing crisis. *Why Washington won't work*. University of Chicago Press. https://doi.org/10.7208/chicago/9780226299358.001.0001

Hilbert, M. (2012). Toward a synthesis of cognitive biases: How noisy information processing can bias human decision making. *Psychological Bulletin*, *138*(2), 211–237. https://doi.org/10.1037/a0025940

Hogg, M. A., Abrams, D., & Brewer, M. B. (2017). Social identity: The role of self in group processes and intergroup relations. *Group Processes & Intergroup Relations*, *20*(5), 570–581. https://doi.org/10.1177/1368430217690909

Hogg, M. A., & Smith, J. R. (2007). Attitudes in social context: A social identity perspective. *European Review of Social Psychology*, *18*(1), 89–131. https://doi.org/10.1080/10463280701592070

Hong, L., & Page, S. E. (2004). Groups of diverse problem solvers can outperform groups of high-ability problem solvers. *Proceedings of the National Academy of Sciences of the United States of America*, *101*(46), 16385–16389. https://doi.org/10.1073/pnas.0403723101

Huber, G. A., & Malhotra, N. (2017). Political homophily in social relationships: Evidence from online dating behavior. *The Journal of Politics*, *79*(1), 269–283. https://doi.org/10.1086/687533

Iyengar, S., Lelkes, Y., Levendusky, M., Malhotra, N., & Westwood, S. J. (2019). The origins and consequences of affective polarization in the United States. *Annual Review of Political Science*, *22*(1), 129–146. https://doi.org/10.1146/annurev-polisci-051117-073034

Iyengar, S., & Westwood, S. J. (2015). Fear and loathing across party lines: New evidence on group polarization. *American Journal of Political Science*, *59*(3), 690–707. https://doi.org/10.1111/ajps.12152

Jern, A., Chang, K. M., & Kemp, C. (2014). Belief polarization is not always irrational. *Psychological Review*, *121*(2), 206–224. https://doi.org/10.1037/a0035941

Johnson, S. G. B., Kim, K. J., & Keil, F. C. (2016). The determinants of knowability. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *38*, 1577–1582. https://escholarship.org/uc/item/8mw0c90j

Jolley, D., & Douglas, K. M. (2017). Prevention is better than cure: Addressing anti-vaccine conspiracy theories. *Journal of Applied Social Psychology*, *47*(8), 459–469. https://doi.org/10.1111/jasp.12453

Kagan, J. (1972). Motives and development. *Journal of Personality and Social Psychology*, *22*(1), 51–66. https://doi.org/10.1037/h0032356

Kahan, D. (2010). Fixing the communications failure. *Nature*, *463*(7279), 296–297. https://doi.org/10.1038/463296a

Kaiser, E., & Rudin, D. (2021). Arguing with experts: Subjective disagreements on matters of taste. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *43*, 924–930. https://escholarship.org/uc/item/8921n58s

Katz, D. (1960). The functional approach to the study of attitudes. *Public Opinion Quarterly*, *24*(2), 163–204. https://doi.org/10.1086/266945

Kelly, T. (2005). The epistemic significance of disagreement. In J. Hawthorne & T. Gendler (Eds.), *Oxford studies in epistemology* (Vol. 1, pp. 167–196). Oxford University Press. https://doi.org/10.1093/oso/9780199285891.003.0007

Kelly, T. (2010). Peer disagreement and higher order evidence. In R. Feldman & T. A. Warfield (Eds.), *Disagreement* (pp. 111–174). Oxford University Press. https://doi.org/10.1093/acprof:Oso/9780199226078.003.0007

Kennedy, K. A., & Pronin, E. (2008). When disagreement gets ugly: Perceptions of bias and the escalation of conflict. *Personality and Social Psychology Bulletin*, *34*(6), 833–848. https://doi.org/10.1177/0146167208315158

King, P. M., & Kitchener, K. S. (2002). The reflective judgment model: Twenty years of research on epistemic cognition. In B. K. Hofer & P. R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp. 37–61). Lawrence Erlbaum.

Kitcher, P. (1990). The division of cognitive labor. *The Journal of Philosophy*, *87*(1), 5–22. https://doi.org/10.2307/2026796

Kivy, P. (2015). *De gustibus: Arguing about taste and why we do it*. Oxford University Press. https://doi.org/10.1093/acprof:Oso/9780198746782.001.0001

Klofstad, C. A., Sokhey, A. E., & McClurg, S. D. (2013). Disagreeing about disagreement: How conflict in social networks affects political behavior. *American Journal of Political Science*, *57*(1), 120–134. https://doi.org/10.1111/j.1540-5907.2012.00620.x

Klopp, E., & Stark, R. (2022). How to change epistemological beliefs? Effects of scientific controversies, epistemological sensitization, and critical thinking instructions on epistemological change. *Education Sciences*, *12*(7), Article 499. https://doi.org/10.3390/educsci12070499

Koenig, M. A., & Harris, P. L. (2005). Preschoolers mistrust ignorant and inaccurate speakers. *Child Development*, *76*(6), 1261–1277. https://doi.org/10.1111/j.1467-8624.2005.00849.x

Kölbel, M. (2004). Faultless disagreement. *Proceedings of the Aristotelian Society*, *104*(1), 53–73. https://doi.org/10.1111/j.0066-7373.2004.00081.x

Kolodny, N., & Brunero, J. (2023). Instrumental rationality. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy* (pp. 1–30). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/sum2023/entries/rationality-instrumental/

Kominsky, J. F., Langthorne, P., & Keil, F. C. (2016). The better part of not knowing: Virtuous ignorance. *Developmental Psychology*, *52*(1), 31–45. https://doi.org/10.1037/dev0000065

Kroupin, I., Davis, H. E., & Henrich, J. (2025). Beyond Newton: Why assumptions of universality are critical to cognitive science, and how to finally move past them. *Psychological Review*, *132*(2), 291–310. https://doi.org/10.1037/rev0000480

Kruglanski, A. W. (2004). *The psychology of closed mindedness*. Taylor & Francis Group. https://ebookcentral.proquest.com/lib/princeton/detail.action?docID=183228

Kruglanski, A. W., & Fishman, S. (2009). The need for cognitive closure. In M. R. Leary & R. H. Hoyle (Eds.), *Handbook of individual differences in social behavior* (pp. 343–353). Guilford Press.

Kruglanski, A. W., Raviv, A., Bar-Tal, D., Raviv, A., Sharvit, K., Ellis, S., & Mannetti, L. (2005). Says who? Epistemic authority effects in social judgment. *Advances in Experimental Social Psychology*, *37*, 345–392. https://doi.org/10.1016/S0065-2601(05)37006-7

Kuhn, D. (2020). Why is reconciling divergent views a challenge? *Current Directions in Psychological Science*, *29*(1), 27–32. https://doi.org/10.1177/0963721419885996

Kuhn, D., Cheney, R., & Weinstock, M. (2000). The development of epistemological understanding. *Cognitive Development*, *15*(3), 309–328. https://doi.org/10.1016/S0885-2014(00)00030-7

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*(3), 480–498. https://doi.org/10.1037/0033-2909.108.3.480

Kurzban, R., & Aktipis, C. A. (2007). Modularity and the social mind: Are psychologists too self-ish? *Personality and Social Psychology Review*, *11*(2), 131–149. https://doi.org/10.1177/1088868306294906

Lackey, J. (2021). *The epistemology of groups*. Oxford University Press.

Landrum, A. R., Eaves, B. S., Jr., & Shafto, P. (2015). Learning to trust and trusting to learn: A theoretical framework. *Trends in Cognitive Sciences*, *19*(3), 109–111. https://doi.org/10.1016/j.tics.2014.12.007

Langenhoff, A. F., Engelmann, J. M., & Srinivasan, M. (2023). Children's developing ability to adjust their beliefs reasonably in light of disagreement. *Child Development*, *94*(1), 44–59. https://doi.org/10.1111/cdev.13838

Leary, M. R., Diebels, K. J., Davisson, E. K., Jongman-Sereno, K. P., Isherwood, J. C., Raimi, K. T., Deffler, S. A., & Hoyle, R. H. (2017). Cognitive and interpersonal features of intellectual humility. *Personality and Social Psychology Bulletin*, *43*(6), 793–813. https://doi.org/10.1177/0146167217697695

Lenz, G. S. (2013). *Follow the leader? How voters respond to politicians' policies and performance*. University of Chicago Press.

Levitsky, S., & Ziblatt, D. (2018). *How democracies die* (1st ed.). Crown Publishing Group. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1517159&site=ehost-live

Lewandowsky, S., Cook, J., & Lloyd, E. (2018). The "Alice in Wonderland" mechanics of the rejection of (climate) science: Simulating coherence by conspiracism. *Synthese*, *195*(1), 175–196. https://doi.org/10.1007/s11229-016-1198-6

Lieder, F., & Griffiths, T. L. (2017). Strategy selection as rational metareasoning. *Psychological Review*, *124*(6), 762–794. https://doi.org/10.1037/rev0000075

Liquin, E. G., Metz, S. E., & Lombrozo, T. (2020). Science demands explanation, religion tolerates mystery. *Cognition*, *204*, Article 104398. https://doi.org/10.1016/j.cognition.2020.104398

Loewenstein, G., & Molnar, A. (2018). The renaissance of belief-based utility in economics. *Nature Human Behaviour*, *2*(3), 166–167. https://doi.org/10.1038/s41562-018-0301-z

Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, *37*(11), 2098–2109. https://doi.org/10.1037/0022-3514.37.11.2098

Lupia, A. (2015). *Uninformed: Why people seem to know so little about politics and what we can do about it*. Oxford University Press.

Mackie, D. M., Gastardo-Conaco, M. C., & Skelly, J. J. (1992). Knowledge of the advocated position and the processing of in-group and out-group persuasive messages. *Personality and Social Psychology Bulletin*, *18*(2), 145–151. https://doi.org/10.1177/0146167292182005

Mandelbaum, E. (2019). Troubles with Bayesianism: An introduction to the psychological immune system. *Mind & Language*, *34*(2), 141–157. https://doi.org/10.1111/mila.12205

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253. https://doi.org/10.1037/0033-295X.98.2.224

Marr, D. (1982). *Vision: A computational investigation into the human representation and processing of visual information*. MIT Press.

McGrath, S. (2011). Skepticism about moral expertise as a puzzle for moral realism. *The Journal of Philosophy*, *108*(3), 111–137. https://doi.org/10.5840/jphil201110837

Mercier, H. (2012). The social functions of explicit coherence evaluation. *Mind & Society*, *11*(1), 81–92. https://doi.org/10.1007/s11299-011-0095-4

Mercier, H. (2016). The argumentative theory: Predictions and empirical evidence. *Trends in Cognitive Sciences*, *20*(9), 689–700. https://doi.org/10.1016/j.tics.2016.07.001

Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behavioral and Brain Sciences*, *34*(2), 57–74. https://doi.org/10.1017/S0140525X10000968

Miller, J. D., Laspra, B., Polino, C., Branch, G., Ackerman, M. S., & Pennock, R. T. (2024). Citizen attitudes toward science and technology, 1957–2020: Measurement, stability, and the Trump challenge. *Science & Public Policy*, *51*(3), 526–542. https://doi.org/10.1093/scipol/scad086

Minson, J. A., Bendersky, C., de Dreu, C., Halperin, E., & Schroeder, J. (2023). Experimental studies of conflict: Challenges, solutions, and advice to junior scholars. *Organizational Behavior and Human Decision Processes*, *177*, Article 104257. https://doi.org/10.1016/j.obhdp.2023.104257

Muis, K. R., Bendixen, L. D., & Haerle, F. C. (2006). Domain-generality and domain-specificity in personal epistemology research: Philosophical and empirical reflections in the development of a theoretical framework. *Educational Psychology Review*, *18*(1), 3–54. https://doi.org/10.1007/s10648-006-9003-6

Mullen, B., Atkins, J. L., Champion, D. S., Edwards, C., Hardy, D., Story, J. E., & Vanderklok, M. (1985). The false consensus effect: A meta-analysis of 115 hypothesis tests. *Journal of Experimental Social Psychology*, *21*(3), 262–283. https://doi.org/10.1016/0022-1031(85)90020-4

Munro, G. D., & Ditto, P. H. (1997). Biased assimilation, attitude polarization, and affect in reactions to stereotype-relevant scientific information. *Personality and Social Psychology Bulletin*, *23*(6), 636–653. https://doi.org/10.1177/0146167297236007

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R^2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133–142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*(2), 175–220. https://doi.org/10.1037/1089-2680.2.2.175

Noelle-Neumann, E. (1977). Turbulences in the climate of opinion: Methodological applications of the spiral of silence theory. *Public Opinion Quarterly*, *41*(2), 143–158. https://doi.org/10.1086/268371

Norenzayan, A. (2013). *Big gods: How religion transformed cooperation and conflict*. Princeton University Press.

Nowak, A., Szamrej, J., & Latané, B. (1990). From private attitude to public opinion: A dynamic theory of social impact. *Psychological Review*, *97*(3), 362–376. https://doi.org/10.1037/0033-295X.97.3.362

Oktar, K. (2025, August 11). *The paths to persistence model (PPM)*. https://osf.io/389as

Oktar, K., Byers, J. B., & Lombrozo, T. (2024). Are disagreements just differences in beliefs? *Proceedings of the Annual Meeting of the Cognitive Science Society*, *46*, 3564–3570. https://escholarship.org/uc/item/2k81k4qs

Oktar, K., Lerner, A., Malaviya, M., & Lombrozo, T. (2023). Philosophy instruction changes views on moral controversies by decreasing reliance on intuition. *Cognition*, *236*, Article 105434. https://doi.org/10.1016/j.cognition.2023.105434

Oktar, K., & Lombrozo, T. (2022). Deciding to be authentic: Intuition is favored over deliberation when authenticity matters. *Cognition*, *223*, Article 105021. https://doi.org/10.1016/j.cognition.2022.105021

Oktar, K., & Lombrozo, T. (2025). How aggregated opinions shape beliefs. *Nature Reviews Psychology*, *4*(2), 81–95. https://doi.org/10.1038/s44159-024-00398-7

Oktar, K., Lombrozo, T., & Griffiths, T. L. (2024). Learning from aggregated opinion. *Psychological Science*, *35*(9), 1010–1024. https://doi.org/10.1177/09567976241251741

Oktar, K., Sucholutsky, I., Lombrozo, T., & Griffiths, T. L. (2024). Dimensions of disagreement: Divergence and misalignment in cognitive science and artificial intelligence. *Decision*, *11*(4), 511–522. https://doi.org/10.1037/dec0000244

Oktar, K., Sumers, T., & Griffiths, T. (2024). A rational model of vigilance in motivated communication. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *46*, 1023–1030. https://escholarship.org/uc/item/3kv0c8b7

Olson, J. M., Ellis, R. J., & Zanna, M. P. (1983). Validating objective versus subjective judgments: Interest in social comparison and consistency information. *Personality and Social Psychology Bulletin*, *9*(3), 427–436. https://doi.org/10.1177/0146167283093013

Osmundsen, M., Bor, A., Vahlstrup, P. B., Bechmann, A., & Petersen, M. B. (2021). Partisan polarization is the primary psychological motivation behind political fake news sharing on twitter. *The American Political Science Review*, *115*(3), 999–1015. https://doi.org/10.1017/S0003055421000290

Ostrom, E. (1999). Coping with tragedies of the commons. *Annual Review of Political Science*, *2*(1), 493–535. https://doi.org/10.1146/annurev.polisci.2.1.493

Padial, J. M., Miralles, A., De la Riva, I., & Vences, M. (2010). The integrative future of taxonomy. *Frontiers in Zoology*, *7*(1), Article 16. https://doi.org/10.1186/1742-9994-7-16

Pennycook, G., & Rand, D. G. (2019). Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. *Cognition*, *188*, 39–50. https://doi.org/10.1016/j.cognition.2018.06.011

Peterson, C. R., & Beach, L. R. (1967). Man as an intuitive statistician. *Psychological Bulletin*, *68*(1), 29–46. https://doi.org/10.1037/h0024722

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In R. E. Petty & J. T. Cacioppo (Eds.), *Communication and persuasion: Central and peripheral routes to attitude change* (pp. 1–24). Springer. https://doi.org/10.1007/978-1-4612-4964-1_1

Pew Research Center. (2016). *U.S. public divides over food science*. https://www.pewresearch.org/science/2016/12/01/the-new-food-fights/

Pew Research Center. (2019, October 10). *2. How partisans view each other*. https://www.pewresearch.org/politics/2019/10/10/how-partisans-view-each-other/

Phillips, L. D., & Edwards, W. (1966). Conservatism in a simple probability inference task. *Journal of Experimental Psychology*, *72*(3), 346–354. https://doi.org/10.1037/h0023653

Plunkett, D., Buchak, L., & Lombrozo, T. (2020). When and why people think beliefs are "debunked" by scientific explanations of their origins. *Mind & Language*, *35*(1), 3–28. https://doi.org/10.1111/mila.12238

Poliakov, L. (2003). *The history of anti-semitism, Volume 3: From Voltaire to Wagner*. University of Pennsylvania Press.

Pool, G. J., Wood, W., & Leck, K. (1998). The self-esteem motive in social influence: Agreement with valued majorities and disagreement with derogated minorities. *Journal of Personality and Social Psychology*, *75*(4), 967–975. https://doi.org/10.1037/0022-3514.75.4.967

Pothos, E. M., Lewandowsky, S., Basieva, I., Barque-Duran, A., Tapper, K., & Khrennikov, A. (2021). Information overload for (bounded) rational agents. *Proceedings of the Royal Society B: Biological Sciences*, *288*(1944), Article 20202957. https://doi.org/10.1098/rspb.2020.2957

Pronin, E., Gilovich, T., & Ross, L. (2004). Objectivity in the eye of the beholder: Divergent perceptions of bias in self versus others. *Psychological Review*, *111*(3), 781–799. https://doi.org/10.1037/0033-295X.111.3.781

Quattrone, G. A., & Jones, E. E. (1980). The perception of variability within in-groups and out-groups: Implications for the law of small numbers. *Journal of Personality and Social Psychology*, *38*(1), 141–152. https://doi.org/10.1037/0022-3514.38.1.141

Quilty-Dunn, J., & Mandelbaum, E. (2018). Against dispositionalism: Belief in cognitive science. *Philosophical Studies*, *175*(9), 2353–2372. https://doi.org/10.1007/s11098-017-0962-x

Rabb, N., Fernbach, P. M., & Sloman, S. A. (2019). Individual representation in a community of knowledge. *Trends in Cognitive Sciences*, *23*(10), 891–902. https://doi.org/10.1016/j.tics.2019.07.011

Ranney, M. A., & Clark, D. (2016). Climate change conceptual change: Scientific information can transform attitudes. *Topics in Cognitive Science*, *8*(1), 49–75. https://doi.org/10.1111/tops.12187

Reeder, G. D., Pryor, J. B., Wohl, M. J. A., & Griswell, M. L. (2005). On attributing negative motives to others who disagree with our opinions. *Personality and Social Psychology Bulletin*, *31*(11), 1498–1510. https://doi.org/10.1177/0146167205277093

Roberts, S. O., Ho, A. K., & Gelman, S. A. (2021). Should individuals think like their group? A descriptive-to-prescriptive tendency toward group-based beliefs. *Child Development*, *92*(2), e201–e220. https://doi.org/10.1111/cdev.13448

Robinson, R. J., Keltner, D., Ward, A., & Ross, L. (1995). Actual versus assumed differences in construal: "Naive realism" in intergroup perception and conflict. *Journal of Personality and Social Psychology*, *68*(3), 404–417. https://doi.org/10.1037/0022-3514.68.3.404

Rosa, L. (2021). Rational requirements for suspended judgment. *Philosophical Studies*, *178*(2), 385–406. https://doi.org/10.1007/s11098-020-01437-8

Ross, L., & Anderson, C. A. (1982). Shortcomings in the attribution process: On the origins and maintenance of erroneous social assessments. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 129–152). Cambridge University Press. https://doi.org/10.1017/CBO9780511809477.010

Ross, L., Greene, D., & House, P. (1977). The false consensus effect: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology*, *13*(3), 279–301. https://doi.org/10.1016/0022-1031(77)90049-X

Ross, L., & Ward, A. (1996). Naive realism in everyday life: Implications for social conflict and misunderstanding. In E. S. Reed, E. Turiel, & T. Brown (Eds.), *Values and knowledge* (pp. 103–135). Psychology Press.

Rozenblit, L., & Keil, F. (2002). The misunderstood limits of folk science: An illusion of explanatory depth. *Cognitive Science*, *26*(5), 521–562. https://doi.org/10.1207/s15516709cog2605_1

Rubin, M., & Badea, C. (2012). They're all the same!… but for several different reasons: A review of the multicausal nature of perceived group variability. *Current Directions in Psychological Science*, *21*(6), 367–372. https://doi.org/10.1177/0963721412457363

Sarkissian, H., Park, J., Tien, D., Wright, J. C., & Knobe, J. (2011). Folk moral relativism. *Mind & Language*, *26*(4), 482–505. https://doi.org/10.1111/j.1468-0017.2011.01428.x

Schroeder, J., Kardas, M., & Epley, N. (2017). The humanizing voice: Speech reveals, and text conceals, a more thoughtful mind in the midst of disagreement. *Psychological Science*, *28*(12), 1745–1762. https://doi.org/10.1177/0956797617713798

Schultz, P. W., & Searleman, A. (2002). Rigidity of thought and behavior: 100 years of research. *Genetic, Social, and General Psychology Monographs*, *128*(2), 165–207.

Schwardmann, P., & van der Weele, J. (2019). Deception and self-deception. *Nature Human Behaviour*, *3*(10), 1055–1061. https://doi.org/10.1038/s41562-019-0666-7

Schweitzer, M. E., Hershey, J. C., & Bradlow, E. T. (2006). Promises and lies: Restoring violated trust. *Organizational Behavior and Human Decision Processes*, *101*(1), 1–19. https://doi.org/10.1016/j.obhdp.2006.05.005

Schwitzgebel, E. (2024). Belief. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy* (pp. 1–27). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/spr2024/entries/belief/

Shafto, P., Eaves, B., Navarro, D. J., & Perfors, A. (2012). Epistemic trust: Modeling children's reasoning about others' knowledge and intent. *Developmental Science*, *15*(3), 436–447. https://doi.org/10.1111/j.1467-7687.2012.01135.x

Shamir, J., & Shamir, M. (1997). Pluralistic ignorance across issues and over time: Information cues and biases. *Public Opinion Quarterly*, *61*(2), 227–260. https://doi.org/10.1086/297794

Shanteau, J. (2015). Why task domains (still) matter for understanding expertise. *Journal of Applied Research in Memory and Cognition*, *4*(3), 169–175. https://doi.org/10.1016/j.jarmac.2015.07.003

Sharot, T., Rollwage, M., Sunstein, C. R., & Fleming, S. M. (2023). Why and when beliefs change. *Perspectives on Psychological Science*, *18*(1), 142–151. https://doi.org/10.1177/17456916221082967

Shavitt, S. (1989). Operationalizing functional theories of attitude. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude structure and function* (pp. 311–337). Psychology Press.

Shenhav, A., Musslick, S., Lieder, F., Kool, W., Griffiths, T. L., Cohen, J. D., & Botvinick, M. M. (2017). Toward a rational and mechanistic account of mental effort. *Annual Review of Neuroscience*, *40*, 99–124. https://doi.org/10.1146/annurev-neuro-072116-031526

Sherif, M. (1956). Experiments in group conflict. *Scientific American*, *195*(5), 54–59. https://doi.org/10.1038/scientificamerican1156-54

Sims, C. A. (2003). Implications of rational inattention. *Journal of Monetary Economics*, *50*(3), 665–690. https://doi.org/10.1016/S0304-3932(03)00029-1

Skitka, L. J., & Sargis, E. G. (2006). The internet as psychological laboratory. *Annual Review of Psychology*, *57*, 529–555. https://doi.org/10.1146/annurev.psych.57.102904.190048

Smaldino, P. E., Moser, C., Pérez Velilla, A., & Werling, M. (2023). Maintaining transient diversity is a general principle for improving collective problem solving. *Perspectives on Psychological Science*, *19*(2), 454–464. https://doi.org/10.1177/17456916231180100

Smeekes, A., & Verkuyten, M. (2013). Collective self-continuity, group identification and in-group defense. *Journal of Experimental Social Psychology*, *49*(6), 984–994. https://doi.org/10.1016/j.jesp.2013.06.004

Soll, J. B., & Larrick, R. P. (2009). Strategies for revising judgment: How (and how well) people use others' opinions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *35*(3), 780–805. https://doi.org/10.1037/a0015145

Sommer, J., & Lombrozo, T. (2025). Do whales have hair? Are whales mammals? Identifying synchronic inconsistencies among beliefs. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *47*, 559–565. https://escholarship.org/uc/item/0q21q4kf

Sommer, J., Musolino, J., & Hemmer, P. (2023). A hobgoblin of large minds: Troubles with consistency in belief. *Wiley Interdisciplinary Reviews: Cognitive Science*, *14*(4), Article e1639. https://doi.org/10.1002/wcs.1639

Son, J.-Y., Bhandari, A., & FeldmanHall, O. (2021). Cognitive maps of social features enable flexible inference in social networks. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(39), Article e2021699118. https://doi.org/10.1073/pnas.2021699118

Sosa, E. (2021). *Epistemic explanations: A theory of telic normativity, and what it explains*. Oxford University Press.

Spear, A. D. (2023). Epistemic dimensions of gaslighting: Peer-disagreement, self-trust, and epistemic injustice. *Inquiry: A Journal of Medical Care Organization, Provision and Financing*, *66*(1), 68–91. https://doi.org/10.1080/0020174X.2019.1610051

Spears, R., Ellemers, N., & Doosje, B. (2009). Strength in numbers or less is more? A matter of opinion and a question of taste. *Personality and Social Psychology Bulletin*, *35*(8), 1099–1111. https://doi.org/10.1177/0146167209336681

Sperber, D., Clément, F., Heintz, C., Mascaro, O., Mercier, H., Origgi, G., & Wilson, D. (2010). Epistemic vigilance. *Mind & Language*, *25*(4), 359–393. https://doi.org/10.1111/j.1468-0017.2010.01394.x

Spiller, S. A., & Belogolova, L. (2017). On consumer beliefs about quality and taste. *The Journal of Consumer Research*, *43*(6), 970–991. https://doi.org/10.1093/jcr/ucw065

Stanovich, K. E., West, R. F., & Toplak, M. E. (2013). Myside bias, rational thinking, and intelligence. *Current Directions in Psychological Science*, *22*(4), 259–264. https://doi.org/10.1177/0963721413480174

Steegen, S., Tuerlinckx, F., Gelman, A., & Vanpaemel, W. (2016). Increasing transparency through a multiverse analysis. *Perspectives on Psychological Science*, *11*(5), 702–712. https://doi.org/10.1177/1745691616658637

Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 261–302). Academic Press. https://doi.org/10.1016/S0065-2601(08)60229-4

Stoetzer, L. F., Leemann, L., & Traunmueller, R. (2024). Learning from polls during electoral campaigns. *Political Behavior*, *46*(1), 543–564. https://doi.org/10.1007/s11109-022-09837-8

Sun, Y., Pan, Z., & Shen, L. (2008). Understanding the third-person perception: Evidence from a meta-analysis. *Journal of Communication*, *58*(2), 280–300. https://doi.org/10.1111/j.1460-2466.2008.00385.x

Svensson, I. (2013). One god, many wars: Religious dimensions of armed conflict in the Middle East and North Africa. *Civil Wars*, *15*(4), 411–430. https://doi.org/10.1080/13698249.2013.853409

Swann, W. B., Jr., Chang-Schneider, C., & Larsen McClarty, K. (2007). Do people's self-views matter? Self-concept and self-esteem in everyday life. *American Psychologist*, *62*(2), 84–94. https://doi.org/10.1037/0003-066X.62.2.84

Taijfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*, *223*(5), 96–102. https://doi.org/10.1038/scientificamerican1170-96

Tanford, S., & Penrod, S. (1984). Social influence model: A formal integration of research on majority and minority influence processes. *Psychological Bulletin*, *95*(2), 189–225. https://doi.org/10.1037/0033-2909.95.2.189

Tetlock, P. E. (2002). Social functionalist frameworks for judgment and choice: Intuitive politicians, theologians, and prosecutors. *Psychological Review*, *109*(3), 451–471. https://doi.org/10.1037/0033-295X.109.3.451

Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior*, *52*(2), 145–161. https://doi.org/10.1177/0022146510395592

Toelch, U., & Dolan, R. J. (2015). Informational and normative influences in conformity from a neurocomputational perspective. *Trends in Cognitive Sciences*, *19*(10), 579–589. https://doi.org/10.1016/j.tics.2015.07.007

Trippas, D., Pennycook, G., Verde, M. F., & Handley, S. J. (2015). Better but still biased: Analytic cognitive style and belief bias. *Thinking & Reasoning*, *21*(4), 431–445. https://doi.org/10.1080/13546783.2015.1016450

Turner, J. C., & Reynolds, K. J. (2012). Self-categorization theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 2, pp. 399–417). SAGE Publications. https://doi.org/10.4135/9781446249222.n46

Van Bavel, J. J., & Pereira, A. (2018). The partisan brain: An identity-based model of political belief. *Trends in Cognitive Sciences*, *22*(3), 213–224. https://doi.org/10.1016/j.tics.2018.01.004

van Prooijen, A.-M., & Sparks, P. (2014). Attenuating initial beliefs: Increasing the acceptance of anthropogenic climate change information by reflecting on values. *Risk Analysis*, *34*(5), 929–936. https://doi.org/10.1111/risa.12152

van Stekelenburg, A., Schaap, G., Veling, H., van't Riet, J., & Buijzen, M. (2022). Scientific-consensus communication about contested science: A preregistered meta-analysis. *Psychological Science*, *33*(12), 1989–2008. https://doi.org/10.1177/09567976221083219

Vesga, A., Van Leeuwen, N., & Lombrozo, T. (2024). Evidence for distinct cognitive attitudes of belief in theory of mind. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *46*, 3557–3563. https://escholarship.org/uc/item/7hm615q7

Vlasceanu, M., Morais, M. J., & Coman, A. (2021). The effect of prediction error on belief update across the political spectrum. *Psychological Science*, *32*(6), 916–933. https://doi.org/10.1177/0956797621995208

von Hippel, W., & Trivers, R. (2011). The evolution and psychology of self-deception. *Behavioral and Brain Sciences*, *34*(1), 1–16. https://doi.org/10.1017/S0140525X10001354

Vrij, A. (2000). *Detecting lies and deceit: The psychology of lying and implications for professional practice* (1st ed.). Wiley.

Wagner-Pacifici, R., & Hall, M. (2012). Resolution of social conflict. *Annual Review of Sociology*, *38*(1), 181–199. https://doi.org/10.1146/annurev-soc-081309-150110

Wainryb, C., Shaw, L. A., Langley, M., Cottam, K., & Lewis, R. (2004). Children's thinking about diversity of belief in the early school years: Judgments of relativism, tolerance, and disagreeing persons. *Child Development*, *75*(3), 687–703. https://doi.org/10.1111/j.1467-8624.2004.00701.x

Wainryb, C., Shaw, L. A., Laupa, M., & Smith, K. R. (2001). Children's, adolescents', and young adults' thinking about different types of disagreements. *Developmental Psychology*, *37*(3), 373–386. https://doi.org/10.1037/0012-1649.37.3.373

Wald, K. A., Kardas, M., & Epley, N. (2024). Misplaced divides? Discussing political disagreement with strangers can be unexpectedly positive. *Psychological Science*, *35*(5), 471–488. https://doi.org/10.1177/09567976241230005

Wedgwood, R. (2012). Outright belief. *Dialectica*, *66*(3), 309–329. https://doi.org/10.1111/j.1746-8361.2012.01305.x

Westfall, J., Van Boven, L., Chambers, J. R., & Judd, C. M. (2015). Perceiving political polarization in the United States: Party identity strength and attitude extremity exacerbate the perceived partisan divide. *Perspectives on Psychological Science*, *10*(2), 145–158. https://doi.org/10.1177/1745691615569849

Wijenayake, S., Van Berkel, N., Kostakos, V., & Goncalves, J. (2022). Quantifying the effect of social presence on online social conformity. *International Journal of Human-Computer*, *158*, Article 102743. https://doi.org/10.1016/j.ijhcs.2021.102743

Williams, J. (2018). *Stand out of our light: Freedom and resistance in the attention economy*. Cambridge University Press. https://doi.org/10.1017/9781108453004

Wilmot, M. P., & Ones, D. S. (2022). Agreeableness and its consequences: A quantitative review of meta-analytic findings. *Personality and Social Psychology Review*, *26*(3), 242–280. https://doi.org/10.1177/10888683211073007

Wilson, D. S., Van Vugt, M., & O'Gorman, R. (2008). Multilevel selection theory and major evolutionary transitions: Implications for psychological science. *Current Directions in Psychological Science*, *17*(1), 6–9. https://doi.org/10.1111/j.1467-8721.2008.00538.x

Wondra, J. D., & Ellsworth, P. C. (2015). An appraisal theory of empathy and other vicarious emotional experiences. *Psychological Review*, *122*(3), 411–428. https://doi.org/10.1037/a0039252

Wood, M. J., Douglas, K. M., & Sutton, R. M. (2012). Dead and alive: Beliefs in contradictory conspiracy theories. *Social Psychological & Personality Science*, *3*(6), 767–773. https://doi.org/10.1177/1948550611434786

Wood, W., Lundgren, S., Ouellette, J. A., Busceme, S., & Blackstone, T. (1994). Minority influence: A meta-analytic review of social influence processes. *Psychological Bulletin*, *115*(3), 323–345. https://doi.org/10.1037/0033-2909.115.3.323

Yang, Q. T., Sleight, S., Ronfard, S., & Harris, P. L. (2023). Young children's conceptualization of empirical disagreement. *Cognition*, *241*, Article 105627. https://doi.org/10.1016/j.cognition.2023.105627

Yarkoni, T. (2022). The generalizability crisis. *Behavioral and Brain Sciences*, *45*, Article e1. https://doi.org/10.1017/S0140525X20001685

Yeo, S. L. (2022). A Bayesian analysis of debunking arguments in ethics. *Philosophical Studies*, *179*(5), 1673–1692. https://doi.org/10.1007/s11098-021-01721-1

Yudkin, D., Hawkins, S., & Dixon, T. (2019). *The perception gap: How false impressions are pulling Americans apart*. https://doi.org/10.31234/osf.io/r3h5q

Zaller, J. R. (1992). *The nature and origins of mass opinion*. Cambridge University Press. https://doi.org/10.1017/CBO9780511818691

Zmigrod, L. (2020). The role of cognitive rigidity in political ideologies: Theory, evidence, and future directions. *Current Opinion in Behavioral Sciences*, *34*, 34–39. https://doi.org/10.1016/j.cobeha.2019.10.016

Zollman, K. J. (2010). The epistemic benefit of transient diversity. *Erkenntnis*, *72*(1), 17–35. https://doi.org/10.1007/s10670-009-9194-6

Received July 17, 2024
Revision received July 9, 2025
Accepted July 22, 2025 ■