Sorting fact from fiction in a complex world under the shadow of motivated reasoning[*]

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PRELIMINARY

Abstract

We combine theory and a survey-experimental study in Austria, Germany, and the UK to investigate how sorting fact from fiction and updating from news are influenced by cognitive ability, motivated reasoning, and overconfidence in complex topics, such as climate change and science. We predict and find that cognitive ability (i.e., both IQ and education) improves news discernment. The positive effect of cognitive ability is robust and immune to motivated reasoning. In particular, the ability to give correct answers that counter one's existing issue opinions and biases increases in IQ and education. These novel results are good news, suggesting the malleability of news discernment. However, when we disaggregate data by news topic, we find that higher cognitive ability may sometimes boost motivated decision making. Our findings suggest that institutions matter. Trust in institutions reduces the magnitude of motivated reasoning, which likely helps limit opinion polarization in the longer term. On average, respondents in Germany perform better than those in Austria and the UK, and Germany ranks ahead of the other two countries in prominent institutional rankings.

Keywords: fake news, misinformation, cognitive ability, motivated reasoning, overconfidence, online study, representative sample

1 Introduction

The current times are characterized by an abundance of news stimuli on different important topics, above and beyond the human capacity to handle. The sources of this abundance are both natural and artificial, e.g., due to large scale circulation of fake content. People are routinely advised to fact-check news. However, the sheer volume they are exposed to everyday makes this almost impossible. Therefore, navigating a complex world with a wealth of (mis)information requires on the spot thought processes to discern the veracity of news and update from new information, often under biases that color people's perceptions of truth.

Our study investigates these (possibly biased) thought processes, which are crucial for the formation and evolution of opinions.[1] To that aim, we combine theory and a large-scale survey-experimental study to investigate how sorting fact from fiction as well as updating from new information are influenced by cognitive and psychological factors in various important topics. It is vital to improve our understanding of the underlying mechanisms because even though the news environment has become more complicated with abundant true and fake news, this has not prevented audiences from being highly opinionated and polarized in complex topics, ranging from climate change to immigration to public health.[2]

We focus on the role of cognitive ability, motivated reasoning (e.g., due to existing issue opinions and preference biases) and overconfidence in news discernment as well as updating from noisy information signals. Participants take a news quiz, which provides a measure of their ability to discern true and fake news. In order to study updating decisions, we give participants the same news quiz twice. The second time they see a news item, they observe a noisy but informative signal concerning its correct answer and may choose to revise their initial assessment. Guided by our theoretical model, we use survey and experimental data to delineate the determinants of news discernment and updating from new information.

Our news quiz has a novel format and satisfies specific criteria. In particular, we systematically chose societally important topics that are contested and politically charged in many countries: immigration, climate change and environment (hereafter, climate change), inequality, and a fourth theme (hereafter, science) at the intersection of science, public health, and controversial (or conspiratorial) content. These are relatively complex societal topics with a constant stream of news, even in the absence of fake news, due to e.g., research, technological progress, new developments, or society wide shocks. While most people arguably have limited knowledge on these topics relative to the existing stock of knowledge, they may still have opinions and biased viewpoints on them, which in turn affect their perceptions of related news. Therefore, studying jointly the two choice environments (news discernment and

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[1] For example, these discernment processes may determine what is retained in memory (e.g., as "true news") or not (due to being deemed false). The retained information then determines opinions and their evolution.

[2] It is also vital to improve this understanding in order to promote better resilience to fake news because the wide reach of such news combined with declining trust in institutions can clearly have dramatic societal consequences.

updating from objectively informative signals) jointly, as we do, provides a more complete picture concerning the mechanisms underlying the processing of news. To fix ideas, consider an individual with an anti-immigrant viewpoint who tends to believe that most congruent news (i.e., with an anti-immigrant stance) items are correct. Does this stem from exposure to one type of news or does actively discounting certain types of news when exposed play a role? Our survey-experimental design allows us to delve deeper into the sources of biased opinions.

Our news quiz has 16 items in total and includes two neutral items that are not on politicized topics. The quiz questions on each news topic are balanced in the bias direction of their correct answers: for example, questions on immigration are balanced in the sense that two correct answers are consistent with a pro-immigrant stance and two with an anti-immigrant stance.[3]

We have a novel approach to study and measure motivated reasoning because our survey questions allow us to determine the existing issue opinions and predispositions of the participants on each topic covered by the news quiz. Thus, in each news topic we can classify each respondent as neutral or preferentially biased, and we can specify the direction of the preference bias in the latter case. Related studies almost always use US samples and news on US politics with a respondent classification based on party identification (Democrat or Republican). Our survey-based cognitive ability measure is a validated and commonly used short version of the Raven Advanced Progressive Matrices (APM) Test that measures IQ. We use educational attainment as an additional measure of cognitive ability. Our overconfidence measure is an absolute measure based on the difference between a participant's guess about their news quiz score and their true score. We have conducted the online study via an international survey company with the general population of three countries: Austria, Germany, and UK.

According to our model, the ability to discern true and false news increases in cognitive ability. Moreover, the effect of cognitive ability is immune to motivated reasoning. That is, the higher the cognitive ability, the higher the ability to recognize correct (false) news on a topic that is inconsistent (consistent) with one's preference bias on that topic. Finally, our model predicts that overconfidence is an impediment to learning and updating from new information. Empirically, overconfidence in the ability to sort fact from fiction may be prevalent.[4] Such overconfidence can generate suboptimal political choices and outcomes (Ortoleva and Snowberg, 2015; Kartal and Tyran, 2022).

As hypothesized, cognitive ability is a highly statistically significant predictor of the ability to discern true and fake news. In fact, both the IQ score (as measured by the APM test) and educational attainment are jointly highly statistically significant. Importantly, the

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[3]An unbalanced choice of questions in that respect may result in an artificial relationship between the direction of a respondent's bias and their ability to discern true and false news.

[4]For example, according to a survey study by the Pew Research Center in the US, 84% of the respondents are (somewhat or very) confident in their ability to recognize fake news.

positive effect of cognitive ability is robust and highly significant even when participants are vulnerable to motivated reasoning. That is, the ability to make correct assessments that counter one's issue biases increases in cognitive ability. Moreover, the counterpart to this statement also holds: the ability to make correct assessments that are bias-consistent also increases in cognitive ability. The latter result may be surprising but has a theoretical basis, as we show in our model. These novel results are highly robust and hold regardless of whether we use only the IQ score or only educational attainment or both to measure cognitive ability. Overall, these results are good news, suggesting that the ability to discern correct and false news is malleable, and higher cognitive ability mitigates the negative effect of motivated reasoning on news discernment.[5]

We next study the extent to which motivated reasoning and cognitive ability jointly influence participant performance in the news quiz. As hinted by the results above, respondents do make an effort to be accurate and give the correct answer (even when they are biased towards the false answer), and the success of this effort increases in cognitive ability. Still, motivated reasoning plays a highly significant role in explaining respondent decision making.[6] We find that the magnitude of the effect of cognitive ability rivals that of motivated reasoning, but only if we vary both educational attainment and the IQ score from very low to very high (or highest) levels.[7] Thus, our results differ from the extant literature (e.g., Pennycook and Rand, 2019; Angelucci and Prat, 2024): in complex topics, motivated reasoning may play a significant role in the evolution of opinions, making polarization easier in the longer term.

On the aggregate, cognitive ability is not associated with the magnitude of motivated reasoning (results disaggregated by news topic are different, as discussed below). Importantly, higher trust in institutions and higher media consumption reduce the magnitude of motivated reasoning on the aggregate. In contrast, voting for an extremist party is associated with higher motivated reasoning.

In the context of updating from noisy but informative signals, the counterpart to motivated reasoning is motivated updating. In addition to a limited willingness to update, we document that respondents do exhibit motivated updating; that is, they are more likely to

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[5] Both fluid and crystallized intelligence is malleable, as exemplified by the Flynn effect, which refers to the sustained increase in intelligence test scores in the 20th century due to societal development. A negative Flynn effect may also be observed. For example, Dutton et al. (2020) conclude that increasing religious emphasis in the Kuwaiti school curriculum significantly reduced intelligence test scores (as measured by Standard Progressive Matrices) among 8 to 15 year olds. Socioeconomic disparities also matter in explaining the variation in intelligence (see also concluding remarks).

[6] In a nutshell, we estimate the magnitude of motivated reasoning by comparing the likelihood of making a correct assessment of news when the correct assessment is consistent with the respondent's preference bias versus when it is inconsistent. In theory, the former is (weakly) higher than the latter, and we refer to this difference between the two as motivated reasoning.

[7] IQ measure, educational attainment, and motivated reasoning are the most important explanatory variables to explain the news quiz score. Some demographic factors, such as gender and age, play a smaller but robust role in explaining the news quiz score.

follow signals that are bias-consistent and revise their initial (bias-inconsistent) answers than the other way round. As a result, one-sided news exposure cannot be the sole explanation for opinion biases: respondents do discount unfavorable news.

Importantly, the aggregate results above conceal some heterogeneity when disaggregated by news topic. In particular, the science topic is distinct from the others as follows. In science, we find that the effect of cognitive ability on news discernment is limited relative to other topics and does not increase in educational attainment. In fact, educational attainment increases motivated reasoning in science: that is, respondents with higher education are more likely to follow their preference bias in this topic. In addition, the magnitude of motivated updating increases in IQ score in science. This suggests that for more highly educated or more intelligent people, science attitudes are more strongly associated with their identity, thereby increasing their tendency for identity-consistent decision making. We do not observe this in other news themes, except for a limited, marginally significant positive effect of the IQ score on motivated reasoning in climate change.

Finally, we document that IQ score has a positive effect and overconfidence has a negative effect on the extent to which participants update from noisy but informative signals in our experiment. In particular, higher overconfidence is associated with a lower likelihood of updating from noisy but informative signals. However, this result only holds among those who are overconfident or well-calibrated. Among the underconfident participants (i.e., among those who estimate their news quiz score lower than it actually is), being less underconfident has a marginally significant but positive effect on updating. We interpret this as being due to underconfident respondents revising their self-confidence over the course of the updating part. Consistent with the Dunning-Kruger effect, highly underconfident participants perform better in the news quiz than other participants and thus have more answers that are consistent with the experimental information signals they receive. This possibly boosts their confidence during the updating part of the study and increases their tendency to discard signals that differ from their answers. This explanation connects to the literature on self-confidence, which shows that there is an asymmetry in updating from good and bad information concerning one's self (see, e.g., Eil and Rao, 2011; Zimmermann, 2020; Mobius et al., 2022).[8] Underconfident participants receive positive information about their performance and likely revise their self confidence upward over the course of the updating part of the study, which limits their learning from signals. Overconfident participants do not seem to adjust despite receiving negative information about their performance during the experiment.

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[8]Our regression analysis shows that the total number of signals that are consistent with a participant's initial answers is a statistically significant explanatory variable for the updating behavior of underconfident participants. In particular, the higher the number of a participant's initial answers that are consistent with the observed signals, the lower the willingness of the participant to change answers in the subsample of underconfident respondents. This is not true in the subsample with well-calibrated and overconfident participants, i.e., they are unresponsive to this variable.

Our paper relates to a growing literature on news discernment discussed in the next section and complements a recent literature investigating the effects of interventions such as fact checking, debunking, and nudges to combat fake news (see for example Pennycook et al., 2020; Henry, Zhuravskaya, Guriev, 2022; Ecker et al., 2022; and the references therein). The experimental part of our study relates to fact-checking, since the information signal observed, though noisy, informs the respondent about the correct answer with a high probability. In practice, fact-checking may sometimes be noisy. Lim (2018) analyzes two major fact-checkers in the US, Fact Checker and Politifact, and reports that their agreement rate can be relatively low for statements in an ambiguous scoring range (i.e., statements that are deemed "Half True" or "Mostly False"). The efficacy of noisy fact-checking may be undermined by motivated updating and a low willingness to update in general, both of which we document in our study.[9] Therefore, it is ideal to combine later-stage interventions, such as fact-checking and nudges, with early interventions, such as high-quality and accessible public education that is designed to promote cognitive skills, which we show improve news discernment and updating from informative signals on the aggregate. More generally, the quality of and trust in overall institutions are likely important. As mentioned earlier, higher trust in institutions is associated with a smaller magnitude of motivated reasoning, which likely helps limit polarization of opinions in the long-run. Our results suggest that on the aggregate, Germany performs better in the news quiz, a possible explanation being that Germany ranks higher than Austria and the UK in well-known institutional and governance rankings (even if all three are highly advanced, rich democracies).[10]

2 Literature

Our study presents a novel, theory-guided framework investigating respondents' news opinions and their evolution through the lens of relevant cognitive and psychological mechanisms. According to Kunda (1990), there are two primary motivations when individuals process news: accuracy motives and directional motives. Accuracy motives refer to the effort to assess news as accurately and dispassionately as possible. Directional motives in our context refer to the inclination of a respondent to assess the accuracy of a news item differently when its content is aligned with their existing issue opinions and preference biases than when it is not. Following a dramatic increase in ideological and political polarization in the US, the

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[9]There is also a debate whether fact checkers are non-partisan and unbiased. Louis-Sidois (2024) identifies the political affiliation of six main French fact-checkers and reports that these fact-checkers are both less likely to fact-check ideologically close entities and more likely to agree with them.

[10] See, e.g., Human Development Index by the UN, the Economist Democracy Index, V-Dem Democracy Indices, Global State of Democracy Indices, World Press Freedom Index by Reporters Without Borders, Corruption Perceptions Index by Transparency International, Rule of Law Index by the World Justice Project, U.S. News rankings for best countries, quality of life, and well-developed public education system, as well as the Education Index by the OECD. Germany ranks higher than Austria and the UK in all of these rankings.

motivated nature of people's assessments, perceptions, and beliefs has been well-documented in the political science and psychology literature.[11] A closely related strand of the literature has focused on the influence of fake news and how it interacts with motivated reasoning.[12]

Our model and empirical results advance this literature in various ways. Our study focuses on news themes that are politicized but more complex than everyday politics. As a result, the magnitude of motivated reasoning we document is more pronounced than the estimates in the extant literature, for example, Angelucci and Prat (2024) and Pennycook and Rand (2019). Nevertheless, we also find that both IQ (as measured by the APM test) and educational attainment mitigate the negative effect of motivated reasoning on accuracy; i.e., cognitive ability boosts the ability of respondents' to make correct news assessments that go *against* their preference biases. Strikingly, IQ and educational attainment also boost the ability of respondents to make correct news assessments that are bias consistent.[13]

To the best of our knowledge, our study is the first to document that IQ (as measured by the APM test) and educational attainment jointly have a strong positive effect on news discernment. The IQ measure based on the APM test score and educational attainment may be viewed as capturing different cognitive ability dimensions. For example, while education is more associated with crystallized ability, the APM test relates more to fluid intelligence. Pennycook and Rand (2019), Bago, Rand, and Pennycook (2020), Assenza and Cardaci (2022), and Arechar et al. (2023) conclude that higher performance in the cognitive reflection test (Frederick, 2005) is associated with better discernment of correct and fake news; however, they do not report an effect of educational attainment. Concerning the effect of education on news discernment, Angelucci and Pratt (2024) and Allcott and Gentzkow (2017) find a positive effect in the US, and Arin et al. (2023) reports a positive effect in Germany but a null effect in the UK. These studies do not have an additional cognitive ability measure. Differently from these studies, we delve deep into the interaction between accuracy, cognitive ability, and motivated reasoning.

On average (across all news topics), the magnitude of motivated reasoning is not affected by either cognitive ability measure. However, when we disaggregate data by topic, we find that results are surprisingly heterogeneous, and that cognitive ability may increase or reduce the magnitude of motivated reasoning depending on the topic. Relatedly, the highly cited studies by Kahan (2013), Kahan et al. (2012), and Kahan et al. (2017) report that individuals with higher performance in the cognitive reflection test and higher numeracy

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[11]See among others Redlawsk, 2002; Taber and Lodge, 2006; Slothuus and De Vreese, 2010; Jerit and Barabas, 2012; Bolsen et al., 2014; Flynn et al., 2017; Peterson and Iyengar, 2021; and the references therein.

[12]See for example Nyhan and Reifler, 2010; Allcott and Gentzkow, 2017; Berinsky, 2017; Flynn et al., 2017; Wood and Porter, 2019; Ecker et al., 2022; Thaler, 2023; and the references therein.

[13]Angelucci and Prat (2024) show that socioeconomic inequalities are associated with large variations in the ability to discern correct and false news in the context of US politics. Our findings on the role of IQ are related: IQ is malleable as discussed in Footnote 5, and variation in IQ is associated with socioeconomic inequalities. See also the concluding remarks.

skills are more likely to engage in motivated reasoning (however, see Persson et al., 2021 for a replication).[14] As stated above, we do not find evidence for an analogous claim on the aggregate. However, cognitive ability increases the magnitude of motivated reasoning and motivated updating in the science theme.

Overall, the empirical literature so far paid limited attention to the role of cognitive biases, such as overconfidence, in the processing of news. To the best of our knowledge, our study is the only one that investigates the role of overconfidence in updating from noisy but objectively informative signals and revising news opinions. Our framework combines the analysis of news discernment and updating from new information to present a fuller picture concerning opinion formation and evolution. Our findings suggest that issue biases may arise not only from being (mostly) exposed to one type of news, but also from a motivated processing of different types of news, as well as a general unwillingness to change initial assessments, for example, due to overconfidence and cognitive limitations.[15]

All of the studies above are conducted in the US and cover news on US politics, except Arechar et al. (2023) which is about COVID-19, and Arin et al. (2023), which involves items on global news. Our findings in three countries provide suggestive evidence that the quality of and trust in overall institutions may matter in explaining both news discernment and the magnitude of motivated reasoning, as explained above.

3 Model

There are two states of the world $S \in \{1, 0\}$ for each news item, where 1 and 0 represent the case where the news item is true and false, respectively. A news item is true (that is, $S = 1$) with prior probability $\pi \in (0, 1)$. Respondent i receives a signal $s_i \in \{1, 0\}$ regarding the veracity of a news item with precision q_i; i.e.,

$$Pr(s_i = 0|S = 0) = Pr(s_i = 1|S = 1) = q_i \geq 0.5.$$

How precision q_i is determined will be explained in detail below. The respondent has two possible choices, $a \in \{1, 0\}$, where $a = 1$ and $a = 0$ represent the case where the news item is assessed to be true and false, respectively.[16]

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[14]In Kahan (2013), Kahan et al. (2017), and the follow-up studies based on their design, respondents make assessments on hypothetical scenarios, which is unknown to them.

[15]As mentioned earlier, higher IQ is associated with a higher willingness to update and revise news assessments.

[16]Our news quiz involves two types of questions: true or false questions and fill-in-the-blank items, where participants select one of two options, 1 and 2. In the main text, we model the decision making of a respondent assuming that the news item is a true or false question, which is without loss of generality. That is, the model readily applies to the other type of item by means of redefining the state of the world, $S \in \{1, 2\}$, where 1 and 2 represent the respective state where the correct answer is 1 and 2. We redefine the precision q_i, signal $s_i \in \{1, 2\}$ and the choice $a \in \{1, 2\}$ correspondingly. For example, $Pr(s_i = 1|S = 1) = Pr(s_i = 2|S = 2) = q_i$.

Our news quiz involves various politicized, contested topics. As a result, there is a valence dimension of each news item in addition to its veracity. For example, each news item on science is consistent with either a pro-science or an anti-science viewpoint. This implies that, depending on their existing issue opinion respondents may derive a higher utility from being correct about certain true news and certain false news. We assume that the valence V_i of a news item for respondent i takes one of two values; i.e., $V_i \in \{0, 1\}$ with the interpretation that an individual has an affinity (i.e., a preference bias) for correct news with valence $V_i = 1$ and false news with $V_i = 0$. In particular,

$$u(a = 1|S = 1, V_i = 0) = u(a = 0|S = 0, V_i = 1) = 1 - v_i$$
$$u(a = 1|S = 1, V_i = 1) = u(a = 0|S = 0, V_i = 0) = 1$$

for respondent i, where $v_i \in [0, \bar{v}]$ with $\bar{v} < 1$. To give an example, the utility that an anti-science respondent i derives from correctly guessing that a news item is true (i.e., $S = 1$) is higher if the news item is anti-science in stance (that is, $V_i = 1$, since respondent i is anti-science) than if it is pro-science (that is, $V_i = 0$). We assume without loss of generality that the utility of a wrong assessment is always 0; i.e.,[17]

$$u(a = 1|S = 0) = u(a = 0|S = 1) = 0.$$

The utility specification above reflects the following idea. All respondents want to be *accurate* since $\bar{v} < 1$. However, the valence of a news item, $V_i \in \{0, 1\}$, matters and generates directional motives affecting the optimal choice of $a \in \{0, 1\}$ for i assuming that $v_i > 0$. This concerns the so-called motivated reasoning, which we formally define below in the language of our model. In a nutshell, motivated reasoning refers in our model to the slant participants exhibit in their news assessments due to their preference over the accuracy (or inaccuracy) of news items depending on their valence.

It is important to note that directional motives may (also) be associated with biased priors such that $Pr_i(S = 1|V_i = 1) > \pi > Pr_i(S = 1|V_i = 0)$, e.g., $Pr_i(S = 1|V_i = 1) = \pi + v_i(1 - \pi)$. Our framework allows for such priors and generates qualitatively identical results to those we report below, so we assume for simplicity that $Pr(S = 1|V_i = 1) = Pr(S = 1|V_i = 0) = \pi$. This assumption implies that the valence of a news item is not informative on its veracity. Our news quiz is consistent with the assumption that $Pr(V_i = 1|S = 1) = Pr(V_i = 1|S = 0) = 0.5$; that is, true and false news are balanced in valence for every i. This assumption is without loss of generality and reflects the intuitive idea that the direction of a respondent's bias is on average unrelated to their news discernment (provided that v_i and θ_i described below are independent).

The precision of s_i, $q_i \in [0.5, 1]$, is associated with i's cognitive ability, which we

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[17]This is to reduce notation. Our results are not affected if we relax the assumption and let the utility of a wrong decision to also depend on the valence of the news item, as with the utility of a correct decision.

denote by $\theta_i \in [\underline{\theta}, \infty)$, where $\underline{\theta} > 0$. θ_i affects the difficulty and the cost of the "cognitive effort" of a news quiz question for participant i. In particular, the higher θ_i, the lower the cognitive cost of an accurate signal as follows. The cost of q_i is given by $\frac{C(q_i)}{\theta_i}$ for i, where $C(0.5) = 0$, $C'(0.5) = 0$ $C'(1) = \infty$, and $C(\cdot)$ is an increasing and strictly convex function of q.

Individual i chooses q_i given θ_i and v_i to maximize ex-ante expected utility (i.e., before $V_i \in \{0, 1\}$ is realized). To understand how expected utility obtains, consider the stage after q_i has been chosen and s_i is realized.

- Assume that the news item is such that $V_i = 0$ for participant i. Then, given our utility specification above, it is optimal to follow the signal $s_i = 0$ (i.e., choose $a = 0$) if and only if $q_i \geq \frac{\pi(1-v_i)}{1-\pi v_i}$, and it is optimal to follow the signal $s_i = 1$ and choose $a = 1$ if and only if $q_i \geq \frac{1-\pi}{1-\pi v_i}$.

- Next, assume that $V_i = 1$. In this case, it is optimal to follow $s_i = 0$ and choose $a = 0$ if and only if $q_i \geq \frac{\pi}{1-v_i+\pi v_i}$, and it is optimal to follow $s_i = 1$ if and only if $q_i \geq \frac{(1-\pi)(1-v_i)}{1-v_i+\pi v_i}$.

To simplify exposition in the main text, we assume that $\pi = 0.5$ (the general case is analyzed in the proof of Proposition 1 in Online Appendix A). From our points above, it follows that (i) if $V_i = 1$ and $s_i = 1$, then $a = 1$ regardless of q_i, and (ii) if $V_i = 1$ and $s_i = 0$, then $a = 0$ if and only if $q_i \geq \frac{1}{2-v_i}$. In addition, (i) if $V_i = 0$ and $s_i = 0$, then $a = 0$ regardless of q_i, and (ii) if $V_i = 0$ and $s_i = 1$, then $a = 1$ if and only if $q_i \geq \frac{1}{2-v_i}$. Combining these results, the ex-ante expected utility of a participant with $\pi = 0.5$ is given by

$$\frac{1}{2}q_i + \frac{1}{2}q_i(1 - v_i) - \frac{C(q_i)}{\theta_i}$$

provided that

$$q_i \geq \frac{1}{2 - v_i}, \tag{1}$$

$$\frac{1}{2}q_i + \frac{1}{2}q_i(1 - v_i) - \frac{C(q_i)}{\theta_i} \geq \frac{1}{2}. \tag{2}$$

Thus, the optimal value of q_i is a function of v_i and θ_i, and is given by the first order condition $C'(q_i) = \frac{\theta_i(2-v_i)}{2}$ provided that q_i satisfies both conditions (1) and (2). If (1) or (2) is not satisfied, i chooses $q_i = 0.5$. These conditions are satisfied for high enough θ_i or low enough v_i. Thus, the higher θ_i, the higher the choice of q_i. That is, the probability of choosing the correct answer increases in cognitive ability.

Note that we could allow the optimal choice of q_i to depend on $V_i \in \{0, 1\}$. This does not affect the main results below (see Online Appendix for this extension). If $\pi = 0.5$, then the optimal value of q_i does not depend on V_i, and the above analysis for $\pi = 0.5$ goes through.

Next, we investigate the disaggregated effect of θ_i on the ability to discern correct and false news in two situations for individuals with a bias for a certain type of news (i.e., $v_i > 0$). The first situation is such that either $V_i = 1$ and $S = 1$ or $V_i = 0$ and $S = 0$. We call this the "motivated state." In the motivated state, the correct assessment regarding the veracity of a news item is consistent with the respondent's preference bias and always results in a utility of 1. The second situation is the counterpart to the first one: either $V_i = 1$ and $S = 0$ or $V_i = 0$ and $S = 1$. We call this the "counter-motivated state." In the counter-motivated state, the correct assessment regarding the veracity of a news item is inconsistent with the respondent's preference bias and always results in a utility of $1 - v_i$ (rather than 1).

It is easy to show that individual i with $v_i > 0$ is more likely to be correct in the motivated state than in the counter-motivated state. Thus, motivated reasoning may be especially harmful in the counter-motivated state, resulting in a relatively low accuracy in that state. Nevertheless, we show that the probability of making the correct assessment in the counter-motivated state increases in cognitive ability. The probability of making a correct assessment in the counter-motivated state, which we denote by $P_{C,i}$, is given by

$$P_{C,i} = \frac{1}{2}Pr(a = 1|V_i = 0, S = 1) + \frac{1}{2}Pr(a = 0|V_i = 1, S = 0),$$

which equals 0 if $q_i = 0.5$ and q_i if $q_i > 0.5$. Thus, the higher θ_i, the higher q_i, and the higher the probability of making the correct assessment in the counter-motivated state.

The probability of making a correct decision in the motivated state, which we denote by $P_{M,i}$, is given by

$$P_{M,i} = \frac{1}{2}Pr(a = 1|V_i = 1, S = 1) + \frac{1}{2}Pr(a = 0|V_i = 0, S = 0),$$

which equals q_i if $q_i > 0.5$ and 1 otherwise. As a result, the probability of making the correct assessment in the counter-motivated state strictly increases in θ_i provided that $q_i > 0.5$.

Hereafter, we refer to "motivated reasoning" as the magnitude of the slant i displays in their news assessments if $v_i > 0$. That is, we formalize "motivated reasoning" in our model as the difference between P_M and P_C. In our simple setup with $\pi = 0.5$, motivated reasoning (i.e., $P_M - P_C$) takes one of two values: it equals either 0 (for $q_i > 0.5$) or 1 (for $q_i = 0.5$). However, for $\pi \neq 0.5$ and $v > 0$, it is possible that $P_M - P_C \in (0, 1)$. Moreover, some extensions of the model results in intermediate levels of motivated reasoning also with $\pi = 0.5$. One very simple extension is to assume that the preference bias is stochastic instead of deterministic as follows. For respondent i with a preference bias $v_i \in [0, \bar{v}]$, the realized bias equals v_i with probability $g(v_i)$ and 1 with the remaining probability, where $g(v_i) = 1$ for $v_i = 0$ and $g(v_i) < 1$ for all $v_i \in (0, \bar{v}]$. In this case, the magnitude of motivated reasoning $P_M - P_C$ is always an interior value if $v_i > 0$ and $q_i > 0.5$. If $q_i = 0.5$ and $v_i > 0$, then $P_M - P_C = 1$ as before. Another simple extension resulting in interior levels of motivated

reasoning involves a stochastic distortion of perceptions of q_i (i.e., underperceiving q_i with some probability $\rho \in (0,1)$ if $s_i = 1$ and $V_i = 0$ or if $s_i = 0$ and $V_i = 1$), which we assume the respondent is ex-ante unaware of (i.e., at the stage where q_i is chosen).

Proposition 1 below holds for generic π and regardless of whether v_i is deterministic or stochastic as described in the extended model above. It also holds in the presence of distorted perceptions of q_i, described above.

Proposition 1 (i) Effect of cognitive ability on the ability to discern correct and fake news: *The probability that an individual makes a correct assessment increases in θ.* **(ii) Effect of cognitive ability in the counter-motivated state:** *P_C, the probability that an individual makes a correct assessment in the counter-motivated state, increases in θ.* **(iii) Effect of cognitive ability in the motivated state:** *For θ high enough (or v_i low enough), $q_i > 0.5$, and thus, P_M increases in θ.*

The results in Proposition 1 (i) and (ii) are stronger than the result in (iii) for P_M because P_M is only piecewise monotone, with a discontinuous decrease at $q_i = \frac{1}{2-v_i}$ if $\underline{\theta} < C'(\frac{1}{2-\bar{v}})\frac{2}{2-\bar{v}}$. If however $\underline{\theta}$ is high enough (or $\bar{v}$ is low enough) so that

$$\underline{\theta} \geq C'(\frac{1}{2-\bar{v}})\frac{2}{2-\bar{v}}$$

($\underline{\theta} \geq C'(\frac{1}{2-\bar{v}})\frac{2}{(2-\bar{v})g(\bar{v})}$ in the extended model with stochastic v_i), then P_M is strictly increasing in θ for all $\theta \geq \underline{\theta}$ with an interior level of motivated reasoning in the extended model.

Alternatively, we can consider the variation in the *average* P_M in the society depending on θ. P_M is strictly increasing in θ_i for all θ if $v_i \in [0, v(\underline{\theta})]$, where $v(\underline{\theta}) > 0$ solves $\underline{\theta} = C'(\frac{1}{2-v(\underline{\theta})})\frac{2}{2-v(\underline{\theta})}$ (it solves $\underline{\theta} = C'(\frac{1}{2-v(\underline{\theta})})\frac{2}{(2-v(\underline{\theta}))g(v(\underline{\theta}))}$ in the extended model). As a result, if the density of v_i in the society (for either direction of bias), denoted by $f(v)$, is such that $\int_{v(\underline{\theta})}^{\bar{v}} f(v)dv$ is sufficiently small, the expected value of P_M in the society for given θ,

$$P_M(\theta) = \int_0^{\bar{v}} P_M(v, \theta) f(v) dv,$$

is increasing in $\theta \in [\underline{\theta}, \infty)$, where $P_M(v, \theta)$ denotes the probability of making the correct assessment in the motivated state given v and θ. In words, this condition on $f(v)$ roughly translates to the following: the bias is not too strong for most people.

Finally, we consider the effect of overconfidence in q on updating from a noisy but informative report, $R \in \{0, 1\}$, where $Pr(R = 0|S = 0) = Pr(R = 1|S = 1) = r > 0.5$. Overconfidence in q may be, for example, due to perceiving a different production function for precision q than the actual one. In particular, an overconfident individual i may assume that the precision is given by $p_i(q_i)$ rather than q_i, where $p_i(q)$ is strictly increasing in q and

$p_i(q) > q$ for all q. Thus, overconfident i believes that

$$Pr(s_i = 0|S = 0) = Pr(s_i = 1|S = 1) = p_i(q_i) > q_i.$$

Overconfidence may prove detrimental to learning and updating from new information. For example, consider the case where i has initially chosen $a = 0$ because $s_i = 0$ and $V = 0$. If i then learns that $R = 1$, changing the choice to $a = 1$ is utility maximizing provided that $q_i < \frac{r(1-v_i)}{1+rv_i}$. However, i will not do so and behave suboptimally (i.e., not update although it is utility maximizing given q_i) if $p_i(q_i) > \frac{r(1-v_i)}{1+rv_i} > q_i$.

Proposition 2 Effect of overconfidence on learning *Higher overconfidence is associated with a lower likelihood of updating from new information.*

Propositions 1 and 2 form the basis of our study hypotheses, discussed in Section 4.7.

4   Study Design

Our study has several parts. It combines a survey and an experiment on updating with measures of (i) news discernment (i.e., the average probability of making a correct assessment in our model); (ii) cognitive ability (i.e., θ_i in our model); (iii) overconfidence (i.e., $p_i(q_i) - q_i$); and (iv) preference biases on news topics in our study (i.e., whether $v_i = 0$ or $v_i > 0$, as well as the direction of the preference bias in the latter case).

Invited participants see a brief description of the study, including its expected duration and pay. If they consent to participation, they are directed to our online study. Below, we describe the survey and experimental design in the same order as participants see it during the study. The instructions and questions of the entire study can be found in Online Appendix C.

4.1   Questionnaire on Demographics

First, participants complete a short questionnaire, which includes questions on gender, age, education, and region of residence. We ask screening demographic questions at the beginning of the study to ensure that the sample in each country is representative of the general population along gender, age, education, and region of residence.

4.2   News Quiz

The news quiz provides a measure of the ability to discern correct and false news. The quiz has 16 questions and is incentivized as every correct answer is rewarded with positive

probability.[18] There are two types of questions: true or false questions and fill-in-the-blank items, where participants select one of two answer options. We sometimes use the latter format to make the correct answer have an unambiguous bias direction, which is crucial for our analysis of motivated reasoning.[19] The order of questions is randomized for each respondent, and the order of choices is randomized in the fill-in-the-blank items.

The quiz covers four topics, which are some of the most challenging and divisive themes of the last decades: immigration, climate change, science, and inequality. Specifically, what we call science is in the intersection of science, public health, and controversial or conspiratorial content, and what we call climate change concerns climate change and environmental issues. News items are balanced within each topic with respect to the bias direction of the correct answers. For example, out of four questions on science, two questions have correct answers consistent with pro-science attitudes, and the other two have correct answers consistent with anti-science attitudes. As explained before, this is in order to avoid an artificial correlation between the direction of biases and news discernment. For example, if all respondents always chose the answers that are consistent with their biases, they would have the same news quiz score. As a control setting, we also include two neutral news items that are not on politicized topics.

The items were selected from a larger set of 40 questions after a pretest with 587 individuals from Germany and the UK. We applied multiple criteria in the selection of both the pretest and the actual quiz items. We narrowed down this list of 40 pretest questions from more than a hundred questions that we ourselves produced by selecting what in our opinion were the most relevant, timely, and important items. Among them, several are highly controversial and concern, for example, the Muslim birth rate, water fluoridation, or 5G, which have been the subject of many (true and fake) news. There were more topics in the pretest than in our final news quiz. We decided to have fewer topics with four items in each of the immigration, climate change, and science topics, and two items in the inequality topic.

Two major criteria for eliminating pretest questions were (i) either a very high or a very low level of difficulty in the pretest, which likely limits variation across respondents and countries; and (ii) maintaining the bias balance of the correct answers in each topic, as explained above. Ex-post, we strived to have relatively balanced subtopics within each topic. For example, we dropped the only news on terrorism (deaths), since it concerns a grim but also a rare phenomenon in the context of immigration. We also eliminated news that were

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[18]In particular, it is explained to participants that two items will be randomly selected to determine their payoff from the news quiz. Participants receive one euro (one pound in the UK) for each correct answer to the selected questions.

[19]For example, consider the following question. "True or false? According to recent research published in a prestigious scientific journal, average sea levels increased by about 8 cm between 1993 and 2019." If a respondent answers false, it is not clear whether they think that the actual increase is lower than or higher than 8 cm. Therefore, we present this as a fill-in-the-blank item with two answer options, 8 cm and 18 cm, thereby making 8 cm (18 cm) the anti-climate change (pro-climate change) option.

relatively more ambiguous in their bias direction. Another objective was to limit the number of country specific questions. Therefore, only the immigration topic involves country-specific questions, and inequality questions concern global inequality.[20] In particular, Austrian and German respondents always see the same items concerning immigration, whereas the UK version differs in two items in that the mentioned statistics concern the UK rather than the EU. Nevertheless, we also ask a UK-specific item regarding the popularity of the baby name "Muhammad" in the Austrian and German surveys, since similar (true and fake) news circulate very often in Western countries in print and social media.

Our news items always cite a source, such as "research published in a prestigious scientific journal," or "official statistics" so that the correct assessment cannot change due to new developments.[21] We do not name sources (e.g., scientific journals), since the general population may not know them however prestigious they may be.

4.3   Overconfidence measure

After participants complete the news quiz, we ask them to guess their news quiz score, i.e., the total number of correct answers in the quiz, which is a number between 0 and 16. The measure of overconfidence then is the difference between a participant's guess and their actual quiz score. The outcome of this measure can be positive, zero, or negative (classified as overconfident, well-calibrated, and underconfident, respectively). Thus, our measure of overconfidence is an average measure: we have not asked participants to report their confidence in every answer to have the median study length at around 25 minutes. For the same reason, we did not incentivize the overconfidence measure.

4.4   Experimental treatment: Updating from information

Our experimental treatment investigates the influence of cognitive and psychological factors on updating from new information and the evolution of opinions. After the participant reports their guess about their performance, they take the same news quiz again. In each news item, the participant sees not only their initial answer but also a noisy but informative binary signal about the correct answer. Instructions explain that a signal shows the correct answer with probability 0.75 and the wrong answer with probability 0.25. The signals are conditionally independent across participants in each news item. Thus, roughly 75% of the respondents observe a correct signal in each news item. After observing the signal for a news item, the participant can revise their initial answer.

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[20]While the rapid spread of globalization since the 1990s has been heavily criticized for valid reasons, it is also argued to be associated with significant reductions in global inequality and global poverty, which could perhaps mitigate some of the resentment against it. However, we find in our news quiz that this is not obvious to or accepted by most people.

[21]Such published research or official statistic may not exist, in which case the news item is false.

We choose a signal precision of 0.75, since it is neither too high nor too low. 0.75 is not too low, and each signal can be viewed as a "fact check" albeit a noisy one. At the same time, 0.75 is not too high (i.e., the signal is false with a nontrivial probability), and therefore, overconfidence may play a significant role in the decision to revise one's beliefs and answers.

The order of the news items in this part is the same as the order of the items the first time. The treatment is incentivized as every correct answer is rewarded with positive probability.[22]

4.5   Survey Measure of Cognitive Ability

Following the treatment, subjects take a 12-item version of the Raven's Advanced Progressive Matrices (APM) test, due to Arthur and Day (1994). This is a validated and commonly used short version of the Raven's APM test. The test score of a participant provides us a with a measure of their cognitive ability. The order of questions is important in the APM test and therefore not randomized. The test is incentivized, and each correct answer is rewarded by 25 cents (20 pence in the UK). The other measure of cognitive ability in our study is educational attainment, which we ask for at the beginning of the study.

4.6   End Surveys

The end survey has two parts. The first part is an opinion survey providing us with a measure of the preference bias of each respondent in each news theme included in our quiz. In particular, it provides us with the information whether $v_i = 0$ or $v_i > 0$ in a topic, and the direction of respondent i's bias if $v_i > 0$. We use tested items from established sources, such as the World Values Survey and the European Values Survey to elicit respondents' biases concerning the topics included in our news quiz. We also measure their ideology (using the 11-point left-right scale) and institutional trust, such as trust in politicians, media, and scientists.

As discussed in the model section, we are interested in not only the overall quiz performance of respondents but also their performance in news items with correct answers that are consistent and inconsistent with their preference biases, i.e., P_C and P_M. We can compute measures of P_C and P_M for each individual with $v_i > 0$ using the news quiz data and the survey data, and analyze how P_C and P_M vary with cognitive ability.

We obtain a measure of respondent bias in a topic based on the respondent's self-reports concerning that topic, e.g., reports of agreement, neutrality, or disagreement with relevant statements. We classify a respondent as preferentially "biased" in a topic (meaning $v_i > 0$) if the respondent provides self-reports in the opinion survey that are consistently

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[22]In particular, for each participant we randomly select one news item and pay the participant one Euro (one pound in the UK) if their final answer to that item is correct.

in the same direction (or neutral) with at least one statement that is not neutral. Our classification also indicates the direction of the bias in this case (e.g., pro-science or anti-science in the context of science). The rest of the respondents are classified as neutral on that topic (i.e., $v_i = 0$) as they must have provided either at least two self-reports that are inconsistent in their bias direction or always neutral self-reports. This is explained in detail in Online Appendix A.

The second part of the end survey asks participants additional background questions, such as employment status, household income, party voting choices, and media consumption.

4.7 Hypotheses

Key outcomes of interest are: (i) news quiz performance (i.e., quiz score); (ii) participant quiz performance in news items with correct answers that are inconsistent with their preference biases (i.e., P_C); (iii) participant quiz performance in items with correct answers that are consistent with their preference biases (i.e., P_M); and (iv) updating from a noisy information signal that is inconsistent with a participant's initial answer in the quiz. In addition, we will test whether respondents exhibit motivated updating; i.e., we will test whether $P_M - P_C$ is greater than 0 as predicted in the model, and we will estimate its magnitude. We will also explore the determinants of motivated reasoning.

We have three preregistered hypotheses concerning these outcomes, which we obtain from our theoretical model in Section 3. In particular, Hypotheses 1 and 2 derive from Proposition 1, and Hypothesis 4 is based on Proposition 2. While Hypothesis 3 also derives from our model (part (iii) of Proposition 1), it is a weak hypothesis as we discuss below, and therefore, we have not preregistered it.

Hypothesis 1 (Effect of cognitive ability on news quiz score) *The news quiz performance (i.e., news quiz score) increases in cognitive ability.*

While Hypothesis 1 concerns the overall ability to sort fact from fiction, Hypothesis 2 concerns performance in the counter-motivated state, P_C. As described above in Section 4.6, counter-motivated state refers to news quiz items with correct answers that are inconsistent with the preference biases of respondents, as measured by our opinion survey. As discussed earlier, motivated reasoning may be pernicious and reduce accuracy in the counter-motivated state. To compute P_C for a respondent, we consider only (1) the news topics in which the respondent is classified as biased (i.e., $v_i > 0$); and (2) the subset of news items in those topics with correct answers that are *inconsistent* with the bias direction of the respondent.[23] These restrictions stem from the theoretical definition of P_C.

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[23]In the preregistration, Hypothesis 2 uses the term "likelihood of making a motivated error", which corresponds to $1 - P_C$, and predicts that the likelihood of making a motivated error decreases in cognitive ability. This is equivalent to our current Hypothesis 2 as the preregistration defines the likelihood of making a motivated error as the share of wrong answers in news quiz items the correct answers to which are inconsistent with the respondents' biases, which is equivalent to $1 - P_C$.

Hypothesis 2 (Effect of cognitive ability in the counter-motivated state) *The likelihood of giving a correct answer in the counter-motivated state (P_C) increases in cognitive ability.*

Hypothesis 3 is based on part (iii) of Proposition 1 and concerns performance in the motivated state, P_M. As described above in Section 4.6, motivated state refers to news quiz items with correct answers that are consistent with the preference biases of respondents, as measured by our opinion survey. Analogous to P_C, we can obtain a measure of P_M, focusing on (1) the news topics in which the respondent is classified as biased; and (2) the subset of news items in those topics with correct answers that are consistent with the biases of the respondent. Hypothesis 3 is a *weak* hypothesis and not preregistered because unlike our other hypotheses, it relies on more stringent theoretical assumptions, as discussed after Proposition 1 in Section 3.

Hypothesis 3 (Effect of cognitive ability in the motivated state) *The likelihood of giving a correct answer in the motivated state (P_M) increases in cognitive ability.*

Finally, Hypothesis 4 concerns the effect of overconfidence on updating. As described in Section 4.4, we focus on cases where respondents' initial answers are inconsistent with the observed signals, from which they may update and revise their answers.

Hypothesis 4 (Negative effect of overconfidence on updating) *Overconfident individuals are less likely to update and change their answers after a signal that conflicts with their initial assessment.*

4.8   Data Collection

Citizen-residents of Austria, Germany, and the UK between 18 and 75 years of age were eligible to participate in the study. The online study links were distributed by Marketagent, a commercial survey company, which partners with online panels of respondents in many countries. Respondents were only paid if they completed the full study. In total, we have data from 3682 respondents (1234 respondents in Austria, 1268 in Germany and 1180 in the UK). The samples in Austria, Germany, and the UK closely match the respective general population along age, gender, educational attainment, region of residence, as well as the employment rate and the unemployment rate.

The participation fee is two euros (1.80 pounds in the UK). The average payoff including the bonus is about five euros. The study was pre-registered before it began in June 13, 2023 with a soft launch. The next phase of the data collection lasted from September 25 to November 5, 2023. The design had a minor change after the soft launch: we slightly increased the bonus per correctly solved APM test question in order to achieve an average total payment of 5 euros.

5   Results

We begin with a brief descriptive analysis of the data and then discuss the evidence for our hypotheses as well as additional analysis conducted in order to further test our theory and explore mechanisms.

For the main analysis sample, we drop the data of participants who are either very fast (indicating speeding through questions and inattention) and those who are very slow suggesting that they may have been distracted by other activities or searched for answers. Specifically, we drop the data of respondents who spent more than 120 minutes (about 5% of the data) and less than 10 minutes (about 7% of the data).[24] However, our main results are robust to including all observations in the analyses below (see Online Appendix A).

Hereafter, our results in the main text refer to results from the main analysis sample. The average time to complete the survey is 27.7 minutes, and the median completion time is 23 minutes. On average, the news quiz score is 8.08 out of 16 (i.e., the share of correct answers is 50.5% on average). While the quiz is not easy, some questions are easier and some harder (see Online Appendix B for scores in individual questions). The quiz score after observing informative signals about the correct answers increases to 9.32. That is, the share of correct answers increases by about 15% (i.e., to 58%). The sample is slightly overconfident in that they believe that they have answered 9.06 items correctly.

5.1   Analysis for Hypothesis 1: The role of cognitive ability

According to Hypothesis 1, the news quiz score increases in cognitive ability. There are two measures of cognitive ability in our study: the survey measure based on the APM test score (i.e., IQ score) and educational attainment. The APM test score and educational attainment may be viewed as capturing different cognitive ability dimensions. For example, while education is more associated with crystallized ability, the APM test relates more to fluid intelligence. The left panel of Figure 1 is a binned scatterplot that illustrates the effect of the IQ score on the news quiz score normalized in percentage terms, controlling for a broad array of respondent characteristics. The right panel replaces the IQ score with educational attainment. Both panels are in line with Hypothesis 1.

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[24]We dropped a larger fraction of the data than our expectation indicated in the preregistration, since we underestimated the share of participants who are too fast (taking less than 10 minutes) or too slow (taking more than two hours).

Figure 1: Effect of cognitive ability on news quiz score
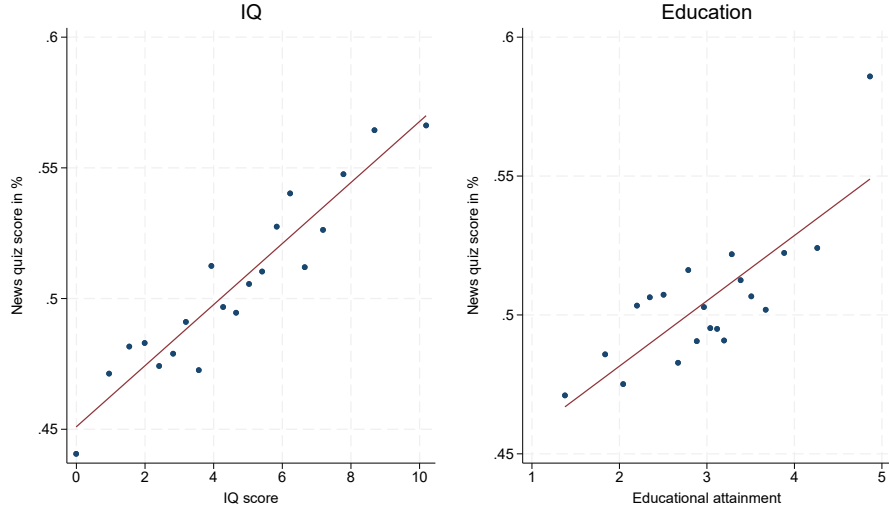
Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. The left and right panels are binned scatterplots showing the respective effect of the IQ measure and educational attainment on the news quiz score. The included controls and fixed effects are the same as in Columns (3), (6), and (7) of Table 1: age, gender, income, employment status, indicator variables for being foreign born, having a foreign born mother, and having a foreign born father, country and survey month fixed effects, as well as media usage, divergence from the median position on the left-right scale (denoted by "median dev"), an indicator variable for extremist party voting, and trust (see Footnote 26 for the explanations of these variables).

Table 1 presents regression estimates of the effect of cognitive ability on the news quiz score in percentage terms. In that table, we report OLS regression specifications with different sets of cognitive ability measures (only IQ score, only educational attainment, and both), different sets of control variables, as well as with and without country and survey month fixed effects.[25] The set of controls include gender, age, income, employment status, indicator variables for being foreign-born, having a foreign-born mother, and having a foreign-born father, as well as measures of media usage, institutional trust, extremist party voting, and divergence from the median position on the left-right scale, which we denote by "median dev" in our regression tables.[26]

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[25]We include survey month fixed effects, since data collection started in June and continued from September to November.

[26]To be precise, the variable "median dev" is the absolute value of the reported difference from the median position of the survey sample on the left-right scale (from 0 to 10), which happens to be the center position (that is, 5) in our survey data. Media usage is the average of TV, radio, newspaper, internet and social media usage to stay informed about current events. Institutional trust (the variable "trust" in regression tables) is the average of trust in politicians, news media, education system, scientists, and social media. Extremist vote is a binary variable indicating whether or not the participant voted for a far-right or a far-left party in

The coefficients of the IQ score and educational attainment, which are the primary explanatory variables of interest are positive, sizeable, and statistically highly significant in every specification they are included in Table 1. We observe limited variation in the coefficients of either variable across different specifications. Our preferred specification for testing Hypothesis 1 is presented in Column 7. It includes both cognitive ability measures, the full set of controls, and country and survey month fixed effects. Column 7 shows that the IQ score and educational attainment are potentially the most influential determinants of the ability to discern correct and fake news.[27] An increase in the IQ score by one unit increases the share of correct answers in the news quiz by 1.1 percentage points, and an increase in educational attainment by one level results in an increase of 1.8 percentage points (IQ score varies from 0 to 12, and educational attainment varies from 1 to 5).[28]

In addition to cognitive ability, demographic characteristics such as age, gender, and income level turn out to be highly statistically significant factors explaining the news quiz score. In particular, older males with higher income and non-centrist views on the left-right scale perform better in the news quiz. On the aggregate, German respondents perform better in the news quiz. While Austria, Germany, and the UK are highly developed and wealthy, Germany has a higher ranking than the other two in well-known institutional and governance rankings (see also Footnote 10).

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the last general election of their country.

[27]In Table 1, we present the coefficient of every explanatory variable that is statistically significant at least at the 10% level in at least one of the specifications. See Table A1 in Online Appendix A.1 for all coefficients.

[28]The coefficients for the IQ score and educational attainment are largely unaffected in the full sample including all observations. See Table A2 in Online Appendix A.1.

Table 1: Effect of Cognitive Ability on News Quiz Score

| | IQ | | | | Education | | IQ & Education |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	0.012***	0.012***	0.012***				0.011***
	(0.001)	(0.001)	(0.001)				(0.001)
education				0.023***	0.026***	0.024***	0.018***
				(0.002)	(0.003)	(0.003)	(0.003)
media usage			0.002			0.010***	0.003
			(0.003)			(0.003)	(0.003)
age			0.001***			0.001**	0.001***
			(0.000)			(0.000)	(0.000)
female			-0.027***			-0.034***	-0.030***
			(0.005)			(0.005)	(0.005)
high-income			0.029***			0.025***	0.021***
			(0.006)			(0.006)	(0.006)
self-employed			0.022**			0.023**	0.021**
			(0.010)			(0.011)	(0.010)
Germany		0.017***	0.015***		0.019***	0.016***	0.019***
		(0.006)	(0.006)		(0.006)	(0.006)	(0.006)
UK		-0.002	-0.007		-0.019***	-0.024***	-0.011
		(0.006)	(0.007)		(0.007)	(0.007)	(0.007)
mother fb			-0.019*			-0.018*	-0.023**
			(0.011)			(0.011)	(0.010)
median dev			0.007***			0.006***	0.006***
			(0.001)			(0.002)	(0.001)
extremist vote			-0.018***			-0.025***	-0.017**
			(0.007)			(0.007)	(0.007)
Observations	3227	3227	3227	3227	3227	3227	3227
Controls	no	no	yes	no	no	yes	yes
Month FE	no	yes	yes	no	yes	yes	yes
Country FE	no	yes	yes	no	yes	yes	yes

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Table reports only the coefficients of statistically significant control variables. See Table A1 in Online Appendix A.1 for the complete set of coefficients. The omitted categories for gender, employment status, and country are male, full-time employee, and Austria, respectively. Columns 1 and 4 show the respective effect of the IQ score and educational attainment on the news quiz score without any controls or fixed effects. Columns 2 and 5 show the respective effect of the IQ score and educational attainment on the news quiz score without any controls, except country and survey month fixed effects. Columns 3 and 6 show the respective effect of the IQ score and educational attainment with the full set of controls as well as country and survey month fixed effects. The included control variables are age, gender, income, employment status, and indicator variables for being foreign born, having a foreign born mother (denoted as "mother fb"), and having a foreign born father (denoted as "father fb"), as well as media usage, an indicator variable for extremist party voting, divergence from the median position on the left-right scale (denoted by "median dev"), and institutional trust (see Footnote 26 for the explanations of these variables). Finally, Column 7 shows the effect of the IQ measure and educational attainment jointly on the news quiz score with the full set of controls and country and survey month fixed effects. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

We repeat the analysis in Table 1 separately for every topic included in the news quiz in Online Appendix A.1.[29] In every news topic except science, the reported effect of the IQ score and educational attainment on the ability to sort fact from fiction mirrors our findings in Table 1. In Table 2, we present the results of the specification in Column 7 of Table 1 for each news topic separately. Table 2 shows that educational attainment has an almost insignificant effect ($p = 0.097$) in science. The underlying reason for this is explained in the next section on motivated reasoning. There, we show that higher educational attainment results in higher motivated reasoning in the science topic. In turn, higher motivated reasoning is associated with a lower quiz score in science. In addition, the coefficients for the IQ score and educational attainment are notably lower in the science theme than in the immigration, climate change, and inequality themes, as shown in Table 2: these differences are highly statistically significant.[30]

To summarize, we find strong support for Hypothesis 1 on the aggregate. However, we also document heterogeneity in the effect of cognitive ability on sorting fact from fiction across different topics. In particular, the effect of the IQ score and educational attainment are significantly smaller in the science topic than in other topics, with the effect of educational attainment virtually insignificant. These findings concerning science are inherently related to motivated reasoning, as discussed in detail in the next section.

Table 2: Effect of Cognitive Ability on Quiz Score by Theme

	Science	Climate Change	Immigration	Inequality	Neutral
IQ score	0.006***	0.011***	0.015***	0.013***	0.009***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Education	0.008*	0.024***	0.015***	0.028***	0.023***
	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)

Notes: Observations = 3277. Table shows the effect of the IQ score and educational attainment on the news quiz score in each theme and for neutral items with the full set of controls and country and survey month fixed effects. See Table 1 for the full set of control variables and see Tables A3–A7 for all coefficients with different regression specifications. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

5.2 Analysis for Hypotheses 2 and 3: Motivated Reasoning

Hypotheses 2 and 3 concern motivated reasoning, which plays a central role in our study because it may impair the ability to sort fact from fiction, especially in what we call the counter-motivated state. After addressing Hypotheses 2 and 3, we will explore the extent and the determinants of motivated reasoning on the aggregate and by news topic separately.

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[29]See Tables A3–A7.

[30]See Table A8 in Online Appendix A.1.

Figure 2: Effect of IQ and education on motivated and counter-motivated quiz score
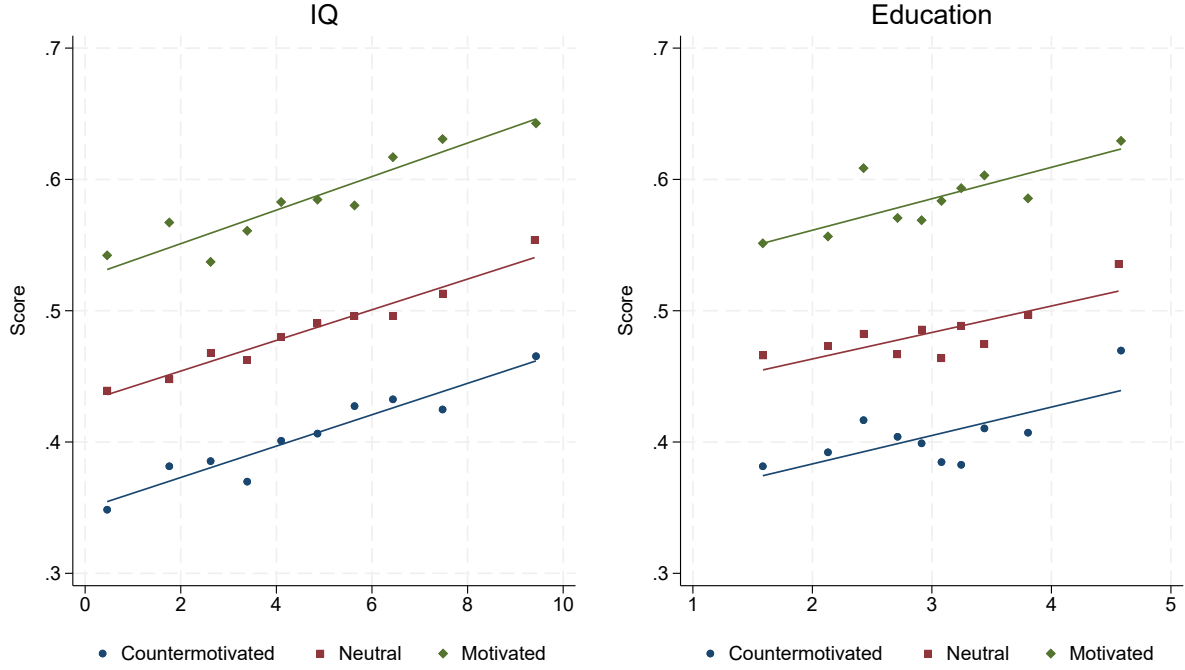
Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. The left and right panels are binned scatterplots showing the effect of cognitive ability on the motivated, counter-motivated, and neutral news quiz scores. The cognitive ability measure is IQ score on the left and educational attainment on the right. As defined in the main text, neutral score refers to the score of a participant in news themes where they are classified as neutral according to their opinion survey responses. The included controls and fixed effects are the same as in Figure 1 and Column 7 of Table 1. See Table 1 notes for the full list.

In the analysis of this section, we focus on news topics in which a respondent is classified as biased according to their answers in the opinion survey, because motivated reasoning concerns a respondent's biases (see Section 4.6 for the detailed explanation of this respondent classification).[31] In every news topic in which a respondent is classified as biased according to our opinion survey, half of the questions have correct answers that are consistent with the biases of the respondent, and the remaining half have correct answers that are bias-inconsistent; that is, every news topic is balanced in the bias of their correct answers, as explained earlier. We obtain two scores for each respondent, focusing only on topics in which they are classified as biased (rather than neutral) according to their opinion survey answers:

(i) *Motivated news quiz score*: this is the average score (normalized in percentage terms) in questions with correct answers that are consistent with the biases of a respondent. This corresponds to P_M in our model in Section 3.

(ii) *Counter-motivated news quiz score*: this is the average score (normalized in percentage terms) in questions with correct answers that are inconsistent with the biases of a respondent. This corresponds to P_C in our model in Section 3.

To make the computation of the motivated news quiz score and the counter-motivated news quiz score more transparent, consider the following question in the immigration topic: "*True or false? According to the latest UK Census, the share of the Muslim population in the UK is higher than 20%.*[32] The answer "true" is in line with the argument that there is an excess number of (Muslim) immigrants in the UK, and thus has an anti-immigrant stance relative to the answer "false", which is the correct answer to the question. Thus, the above question is part of the motivated news quiz score for anti-immigrant respondents and the counter-motivated score for pro-immigrant respondents. No question on the immigration topic is part of the motivated or counter-motivated score for respondents classified as neutral in this topic.

Hypothesis 2 states that the counter-motivated news quiz score (P_C) increases in cognitive ability. The blue lines with dots on the left and right panels of Figure 2 demonstrate that, as predicted, an increase in the IQ score or educational attainment increases the counter-motivated score. Two remarks concerning Figure 2 are in order. Figure 2 also plots the motivated news quiz score (P_M), and we can compare the regression lines for the motivated score (green lines with diamonds) and the counter-motivated score. We observe that in each panel the green line is much more elevated than the blue line, which already hints at the significant presence of motivated reasoning: participants are much more successful

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[31]In the baseline model, we model this bias as a preference bias, which manifests itself as an asymmetry in the utility of a correct assessment depending on the valence of news items. As also discussed in the model, we can allow for biased priors and/or biased perceptions of q_i, which are other possible sources of bias. Our hypotheses are not affected by these extensions.

[32]Only two questions differ across countries and this is one of them. In Austria and Germany, we replace the UK with the EU.

at those questions with correct answers that are consistent with their biases. For reference, Figure 2 also presents the *neutral news quiz score* (red line with squares), which we define as the quiz score of a participant in news topics in which they are classified as neutral according to their responses in the opinion survey. One expects this score to be between the motivated score and the counter-motivated score, which is indeed the case.

Figure 3 is in line with Figure 2 and shows that the three scores are significantly different, increasing monotonically from the counter-motivated score to the neutral score to the motivated score. Figures 2 and 3 already hint at the significant presence of motivated reasoning: participants are more successful in the motivated state than in the counter-motivated state, consistent with our discussion in Section 3.

Table 3 presents regression estimates of the effect of cognitive ability on the counter-motivated score to test Hypothesis 2. In that table, we present the coefficient of every explanatory variable that is statistically significant at least at the 10% level.[33] Our preferred specification is Column 7, which includes both cognitive ability measures, the full set of controls, and country and survey month fixed effects. The IQ score and educational attainment are potentially the most influential variables explaining the counter-motivated score, analogous to our results in Section 5.1. Increasing the IQ score from 0 to 12 increases the motivated score by more than 13 percentage points, and increasing the level of education from the lowest to the highest level increases the score by about 6.5 percentage points.

According to Hypothesis 3, the motivated news quiz score (P_M) increases in cognitive ability (under certain conditions, e.g., if the preference biases are not too strong for most people). Top and bottom left panels of Figure 2 demonstrate that an increase in the IQ score or educational attainment increases the motivated score. Table 4 is analogous to Table 3, except that it replaces the counter-motivated news quiz score with the motivated score. Table 4 presents the coefficient of every explanatory variable that is statistically significant at least at the 10% level.[34] Once again, the IQ score and educational attainment are potentially the most influential variables explaining the motivated score, analogous to our previous results.

Hence, on the aggregate the effect of cognitive ability is sizeable, highly statistically significant and robust to the presence of motivated reasoning: participants do try to answer questions accurately despite having biases, and the success of their effort increases in *both* the IQ score and educational attainment.

We now combine the motivated and counter-motivated scores to formally document the presence of motivated reasoning and explore the extent to which motivated reasoning and cognitive ability jointly influence the ability to sort fact from fiction. Table 5 presents panel regression estimates in which the dependent variable is the (motivated or counter-motivated) quiz score for each participant, and every specification involves our cognitive ability measures as well a dummy variable called "Motivated", which indicates if the quiz score refers to the

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[33]See Table A9 in Online Appendix A.2 for all coefficients.
[34]See Table A10 in Online Appendix A.2 for all coefficients.

Table 3: Effect of cognitive ability on counter-motivated news quiz score

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.013***	0.013***	0.012***				0.011***
	(0.002)	(0.002)	(0.002)				(0.002)
education				0.030***	0.030***	0.022***	0.016***
				(0.005)	(0.005)	(0.006)	(0.006)
media usage			-0.014*			-0.006	-0.012*
			(0.007)			(0.007)	(0.007)
trust			0.008***			0.008***	0.007**
			(0.003)			(0.003)	(0.003)
female			-0.033***			-0.038***	-0.035***
			(0.010)			(0.010)	(0.010)
high-income			0.033***			0.031***	0.027**
			(0.012)			(0.012)	(0.012)
student			0.048*			0.057**	0.052*
			(0.027)			(0.027)	(0.028)
father fb			0.038*			0.034*	0.037*
			(0.020)			(0.020)	(0.020)
extremist vote			-0.038***			-0.045***	-0.038***
			(0.014)			(0.014)	(0.014)

Notes: Observations = 3112. Table reports only the coefficients of statistically significant control variables. See Table A9 in Online Appendix A.2 for the complete set of coefficients. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and fixed effects. The omitted category for employment status is full-time employee. The variable "father fb" refers to the indicator variable for having a foreign-born father. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

motivated score (= 1) or the counter-motivated score (= 0). Specifications in Table 5 estimate the effect of motivated reasoning and cognitive ability jointly. In particular, the variable "Motivated" allows us to estimate the extent of motivated reasoning in our sample.

Table 4: Effect of cognitive ability on motivated news quiz score

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.012***	0.012***	0.013***				0.012***
	(0.002)	(0.002)	(0.002)				(0.002)
education				0.017***	0.019***	0.024***	0.017***
				(0.005)	(0.005)	(0.005)	(0.005)
media usage			0.013*			0.021***	0.014**
			(0.007)			(0.007)	(0.007)
trust			-0.005*			-0.005*	-0.006**
			(0.003)			(0.003)	(0.003)
age			0.001			0.000	0.001*
			(0.000)			(0.000)	(0.000)
female			-0.025**			-0.031***	-0.027***
			(0.010)			(0.010)	(0.010)
self-employed			0.061***			0.062***	0.061***
			(0.021)			(0.021)	(0.021)
UK		-0.003	-0.008		-0.019	-0.025*	-0.011
		(0.013)	(0.014)		(0.013)	(0.014)	(0.014)
mother fb			-0.053**			-0.053**	-0.056**
			(0.023)			(0.023)	(0.023)
median dev			0.007**			0.006**	0.007**
			(0.003)			(0.003)	(0.003)

Notes: Observations = 3112. Table reports only the coefficients of statistically significant control variables. See Table A10 in Online Appendix A.2 for the complete set of coefficients. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and fixed effects. Baseline employment status is full-time employee. The omitted category for country is Austria. See the main text and Footnote 26 for the explanation of the variable "median dev." The variable "mother fb" refers to the indicator variable for having a foreign-born mother. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 5: Joint effect of cognitive ability and motivated reasoning

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
Motivated	0.180***	0.180***	0.180***	0.180***	0.180***	0.180***	0.180***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
IQ score	0.012***	0.013***	0.012***				0.011***
	(0.001)	(0.001)	(0.001)				(0.001)
education				0.024***	0.025***	0.023***	0.017***
				(0.004)	(0.004)	(0.004)	(0.004)
age			0.001**			0.000	0.001**
			(0.000)			(0.000)	(0.000)
female			-0.029***			-0.035***	-0.031***
			(0.007)			(0.007)	(0.007)
high-income			0.020***			0.018**	0.014*
			(0.008)			(0.008)	(0.008)
self-employed			0.039***			0.040***	0.039***
			(0.014)			(0.015)	(0.014)
mother fb			-0.031**			-0.030**	-0.034**
			(0.015)			(0.015)	(0.015)
father fb			0.034**			0.030**	0.033**
			(0.014)			(0.014)	(0.014)
median dev			0.006***			0.005**	0.005**
			(0.002)			(0.002)	(0.002)

Notes: Observations = 6224 (3112 × 2 types of scores). Table reports the results of panel regressions. Motivated is a dummy variable, illustrating the role of motivated reasoning in accuracy: it equals 1 (0) if the score refers to the motivated (counter-motivated) score of a respondent. Table reports only the coefficients of statistically significant control variables. See Table A11 in Online Appendix A.2 for all coefficients. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and fixed effects. The omitted category for employment status is full-time employee. The variables "mother fb" and "father fb" refer to the indicator variables for having a foreign-born mother and foreign-born father, respectively. See the main text and Footnote 26 for the explanation of the variable "median dev." Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 5 reports that the magnitude of motivated reasoning is 18%, which is highly statistically significant. Recall from Section 3 that we defined motivated reasoning as the difference between the motivated score and the counter-motivated score (in percentage terms), which takes a value between 0 and 1. For example, a respondent who answers the news quiz *solely* according to their preference biases will have a difference of one between the two values, because the motivated score equals one, and the counter-motivated score equals zero in that situation. While motivated reasoning has a clearly sizeable impact on decision making, the difference at 18 percentage points is much closer to zero than one, indicating that respondents do make an effort to be accurate, and that on average their preference biases are not too strong.[35] The success of this effort increases in cognitive ability as our regression results show. We also note that the magnitude of the effect of cognitive ability (measured jointly by the IQ score and educational attainment) rivals that of motivated reasoning, but only when we vary their levels from very low to very high.

Table 6 shows the joint impact of motivated reasoning and cognitive ability for each news topic using the specification in Column 7 of Table 1, which involves both cognitive ability measures and the full set of controls and fixed effects. In every topic, motivated reasoning plays a major role to explain participant decision making. The reported effect of cognitive ability on the news quiz score in Table 6 mirrors our findings in Table 2: the effect of the IQ score and educational attainment are smaller in the science theme than in other themes, with the effect of educational attainment insignificant in science. We will elaborate on this point further below.

Table 6: Joint effect of cognitive ability and motivated reasoning by theme

	Science	Climate Change	Immigration	Inequality
Motivated	0.232***	0.090***	0.215***	0.289***
	(0.011)	(0.010)	(0.013)	(0.016)
IQ score	0.007***	0.013***	0.018***	0.013***
	(0.002)	(0.002)	(0.002)	(0.002)
education	0.008	0.024***	0.020***	0.029***
	(0.006)	(0.006)	(0.006)	(0.008)
Observations	4444	4510	3482	4406

Notes: Table reports the results of panel regressions with the full set of controls and country and survey month fixed effects in each theme. Motivated is a dummy variable: it equals 1 (0) if the score refers to the motivated (counter-motivated) score of a respondent in a news theme. Table presents the coefficients of only Motivated, IQ score, and educational attainment (see Table A12 in Online Appendix A.2 for all coefficients). Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

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[35]This in turn explains why we found support for Hypothesis 3.

We now explore the correlates of motivated reasoning. For this purpose, we directly use our definition of motivated reasoning in Section 3 as the dependent variable: the difference between the motivated score and the counter-motivated score of an individual (i.e., $P_M - P_C$). Table 7 shows that only four variables are associated with motivated reasoning: media usage, institutional trust, extremist party voting, and being a student (versus a full-time employee). The higher the media usage and the higher the institutional trust, the lower the magnitude of motivated reasoning. Perhaps unsurprisingly, motivated reasoning increases in extremist party voting. Finally, students exhibit less motivated reasoning than full-time employees.

Table 7: Correlates of motivated reasoning

| | | IQ | | | Education | | IQ & Education |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	-0.000	-0.000	0.001				0.001
	(0.002)	(0.002)	(0.003)				(0.003)
education				-0.013*	-0.011	0.002	0.002
				(0.007)	(0.007)	(0.008)	(0.008)
media usage			0.026**			0.027***	0.026**
			(0.010)			(0.010)	(0.010)
trust			-0.013***			-0.013***	-0.013***
			(0.004)			(0.004)	(0.004)
student			-0.086**			-0.085**	-0.085**
			(0.040)			(0.040)	(0.040)
extremist vote			0.055**			0.054**	0.055**
			(0.022)			(0.022)	(0.022)

Notes: Observations = 3112. Dependent variable is motivated reasoning, defined as the difference between the motivated score and counter-motivated score of a respondent. Table reports only the coefficients of IQ score, educational attainment, and statistically significant control variables. See Table 1 for the full list of control variables. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and fixed effects. The omitted category for employment status is full-time employee. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

On the aggregate, cognitive ability is not associated with motivated reasoning (except for a marginally significant coefficient for education in Column 4). However, when we disaggregate data by topic, the picture concerning the effect of the IQ score and educational attainment is surprisingly heterogeneous. Importantly, the coefficient for educational attainment is positive and economically and statistically highly significant in the science topic, as Table 8 shows.[36] This finding connects to our results in Tables 2 and 6, which show that education does not have a significant effect on accuracy in science, unlike in other news topics (also, education does not improve the counter-motivated score in science unlike in

[36]In contrast, educational attainment reduces motivated reasoning in the immigration topic, and the IQ score reduces motivated reasoning in the inequality topic.

other topics). These findings complement each other as follows. A regression analysis shows that the quiz score in science decreases in the magnitude of motivated reasoning, which is highly statistically significant.[37] However, motivated reasoning in science strongly increases in educational attainment, as shown in Table 8. As a result, educational attainment does not produce a positive effect on accuracy in the science topic. A similar effect of cognitive ability (this time, the IQ score) on motivated reasoning is present in the climate theme, but it is marginally significant and smaller in magnitude.[38]

We find an analogue result in the updating part of the study, which we will discuss in more detail in Section 5.4: higher IQ results in a higher magnitude of motivated reasoning (i.e., a higher slant in the willingness to revise a quiz answer depending on whether the experimental signal is bias-consistent), but only in the science topic. Therefore, we conjecture that attitudes on certain news topics, such as science, may be more closely associated with the "identity" of more highly educated or higher IQ individuals than other individuals, thus amplifying their motivated decision making in science. In the language of our model, this suggests a significant, positive correlation between θ and v. It is sometimes also argued that individuals with higher cognitive ability are in a better position to produce evidence for (against) news they are motivated to accept (reject), which may be a contributing factor to these findings.

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[37]We regress the quiz score in the science topic on motivated reasoning in science (i.e., the difference between the motivated and counter-motivated science quiz scores), the IQ score, educational attainment, the full set of controls and fixed effects, and find that the coefficient for motivated reasoning is negative and highly statistically significant. The coefficient of educational attainment is also insignificant in this regression, consistent with Tables 2 and 6.

[38] Another method to measure the effect of cognitive ability on motivated reasoning is using a panel regression approach (e.g., using the specification in Column 7 of Table 7), and interacting the dummy variable "Motivated" with the IQ score and educational attainment. We obtain very similar results to those in Table 7 and Table 8. In particular, the interaction term "Motivated×education" is strictly positive and highly statistically significant in the science theme, implying that motivated reasoning increases in educational attainment.

Table 8: Effect of cognitive ability on motivated reasoning by theme

	Science	Climate Change	Immigration	Inequality
IQ score	0.007	0.007*	0.004	-0.014**
	(0.004)	(0.004)	(0.005)	(0.006)
education	0.041***	-0.009	-0.045***	-0.003
	(0.013)	(0.012)	(0.015)	(0.019)
Observations	2222	2255	1741	2203

Notes: Dependent variable is motivated reasoning in a news theme, defined here as the difference between the motivated score and counter-motivated score of a respondent in that theme. Table reports the coefficients of IQ score and educational attainment in regressions with the full set of controls and country and survey month fixed effects in each theme (see Table A14 in Online Appendix for all coefficients). Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

5.3 Analysis for Hypothesis 4: Overconfidence and Updating

This section addresses Hypothesis 4 and studies whether overconfidence reduces the tendency to revise answers in response to new information. In this part of the study, respondents take the same news quiz again. In every question, they are shown their initial answer as well as a noisy but informative signal concerning the correct answer, after which they may change their initial assessment. Our overconfidence measure is the difference between a respondent's elicited news quiz score and the actual score. If this measure is positive, negative, or 0, then the respondent is overconfident, underconfident, or well-calibrated respectively.[39]

To measure updating in the experiment, we consider only cases where respondents' initial answers to news items are inconsistent with the information signals they observe. Consequently, our measure of updating is the share of revised answers among all news items where the respondent's initial answers differ from the experimental signals.

On average, the share of updated answers is 31%, which seems to be low given that the average share of correct answers (the first time the quiz is taken) is only 50.5%, and the precision of a signal is 75%. The low share of updating explains the limited increase in the news quiz score in this part of the study.

The main specification for testing Hypothesis 4 regresses updating (i.e., the share of changed answers in the relevant news items described above) on the overconfidence measure, the full set of controls, cognitive ability measures, and the news quiz score.

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[39]As mentioned earlier, this aggregate measure of confidence has costs and benefits. It is noisier but faster than asking participants to report their confidence in every answer they give.

Table 9: Effect of Overconfidence on Updating Decisions

	All data				Overconfident or well-calibrated				Underconfident			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
OC	0.002	0.001	0.000	0.000	-0.005*	-0.008***	-0.009***	-0.009***	0.008	0.009*	0.010*	0.010*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
IQ score			0.010***	0.010***			0.012***	0.012***			0.005	0.005
			(0.002)	(0.002)			(0.003)	(0.003)			(0.004)	(0.004)
Education							0.005	0.005			-0.014	-0.014
							(0.009)	(0.009)			(0.011)	(0.011)
Quiz score			-0.109**	-0.087			-0.173**	-0.191**			-0.047	0.049
			(0.052)	(0.058)			(0.068)	(0.074)			(0.090)	(0.099)
Consistent				-0.003				0.002				-0.013**
				(0.003)				(0.004)				(0.006)
Observations	3227	3227	3227	3227	2192	2192	2192	2192	1035	1035	1035	1035
Controls	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Month FE	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country FE	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Columns (1) and (4) show the respective effect of our IQ measure and educational attainment on the news quiz score without any controls or country and survey time fixed effects. Columns (2) and (5) show the respective effect of the IQ measure and educational attainment on the percentage of motivated errors without any controls, except country and survey month fixed effects. Columns (3) and (6) show the respective effect of the IQ measure and educational attainment on the percentage of motivated errors with the full set of controls as well as country and survey month fixed effects. The included control variables are the same as in Table 1. Finally, Column (7) shows the effect of the IQ measure and educational attainment jointly on the percentage of motivated errors with the full set of controls and country and survey month fixed effects. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Figure 3: Effect of overconfidence on updating
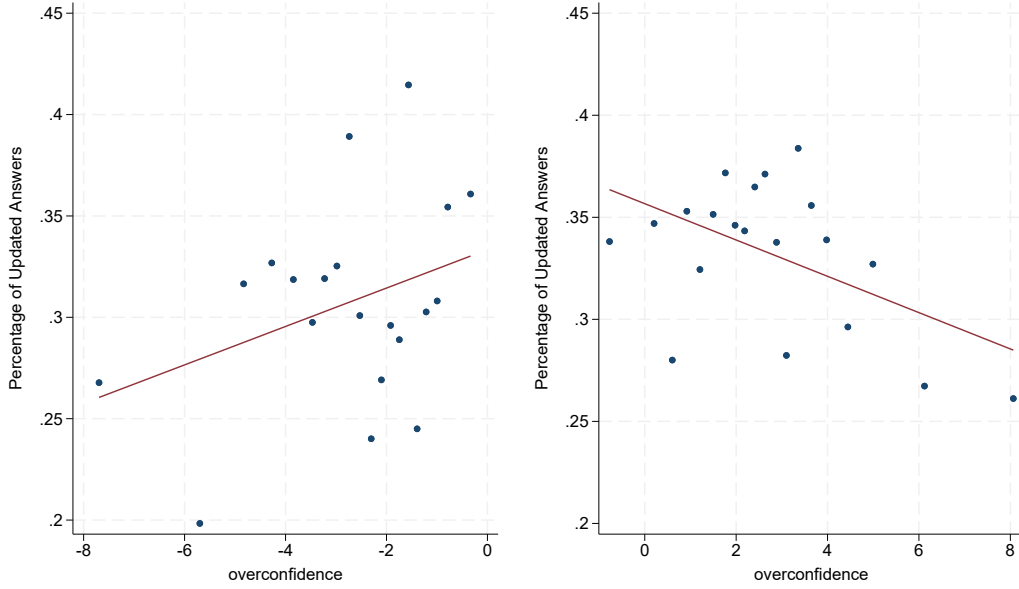
Notes: The left and right panels show the effect of higher (over)confidence in the underconfident and the weakly overconfident sample, respectively. The included controls are all the controls in the main specification in Column (3) of Table 9.

Column (1) in Table 9 shows that there is no discernible effect of overconfidence in the overall sample. Nevertheless, the effect of the cognitive ability measure and the news quiz score are highly statistically significant: an increase in the APM test score or a decrease in the news quiz score does increase the share of updated answers. These are both intuitive findings. In particular, all else equal, those with a higher news quiz score should on average update less than those with a lower score.[40]

Next, we split the sample into (i) underconfident respondents (i.e., respondents with negative overconfidence score) and (ii) overconfident or well-calibrated respondents (i.e., respondents with weakly positive overconfidence measure). A different picture emerges with these two groups, as shown in Figure 3. In particular, focusing on overconfident or well-calibrated respondents, the negative effect of overconfidence on updating is evident: the higher the overconfidence, the lower the percentage of updated answers. An increase in the overconfidence score by one reduces updating by 0.9 percentage points, as shown in Column (2) in Table 9 ($p < 0.001$).[41] Again, an increase in the APM test score or a decrease in the

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[40]For example, two respondents who overestimate their news quiz score by four may be expected to behave very differently if one of them has an actual score of 12 and the other has a score of six. In particular, we expect the former to revise fewer answers than the latter.

[41]Including education as an additional explanatory variable does not affect this result. In addition, its coefficient is insignificant.

news quiz score does increase the share of updated answers.

Figure 4: Overconfidence, News quiz score, and Answer-signal Consistency
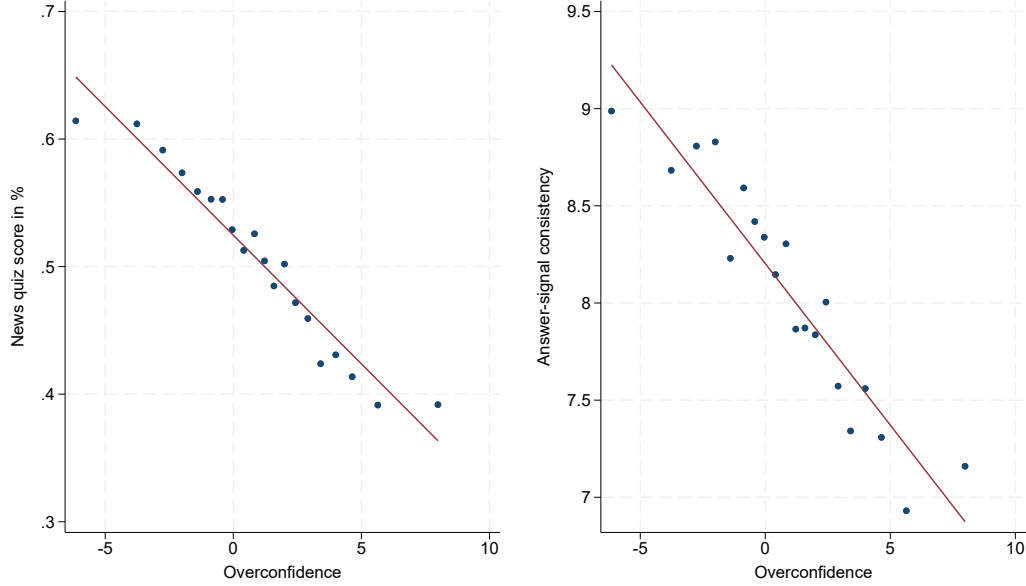
Notes: The left and the right panels show how overconfidence relates to the news quiz score and answer-signal consistency, respectively. The included controls are all the controls in Column (4) of Table 9 except the news quiz score and answer-signal consistency.

However, results are different for underconfident respondents. Column (4) shows that the coefficient of the overconfidence measure becomes positive, which is marginally significant.[42] To explore the most likely mechanism behind this, we note that respondents may update their confidence during this part of the study, depending on how consistent their initial answers and information signals are. Therefore, we include an additional explanatory variable in the regression, which equals the total number of signals that are consistent with a respondent's initial answers. In the following, we refer to this variable as the answer-signal consistency variable (shortened as "consistent" in Table 9). The coefficient of this variable is negative and statistically significant in the underconfident sample, as we expected. That is, the higher the number of initial answers that are consistent with the experimental information signals, the lower the likelihood of updating among the underconfident, pointing to a confidence boosting effect of the answer-signal consistency. The coefficient of this variable is not significant in the weakly overconfident sample.

This asymmetry in the effect of the answer-signal consistency variable is not surprising in light of the literature on self-confidence, which documents an asymmetry in updating from

[42]Also, the APM test score or the news quiz score no longer matter.

good and bad signals concerning ego relevant attributes.[43] We find that, consistent with the Dunning-Kruger effect, underconfident participants perform better in the news quiz than overconfident participants and thus observe a higher answer-signal consistency (shown in the left and right panels of Figure 4). As a result, the underconfident may update from good news about themselves (i.e., relatively high answer-signal consistency), but the overconfident do not seem to update from bad news. Indeed, the positive coefficient of the overconfidence variable suggests that the highly underconfident may have revised their confidence in a way that changes the confidence ordering of respondents, which our confidence measure does not capture as it is elicited only once, before the experiment begins.

To summarize, our measure of confidence may be highly noisy in the case of (highly) underconfident respondents, who may positively revise their confidence over the course of the experiment. Such upward revision in confidence in turn limits learning from experimental information signals. Thus, we find evidence for Hypothesis 4 only in the subsample of over-confident and well-calibrated respondents, by documenting that an increase in overconfidence reduces updating within this group of respondents.

5.4 Motivated updating

The previous section suggests that respondents exhibit an asymmetry in updating from good and bad news concerning an ego-relevant attribute, i.e., the news quiz performance. We now consider another form of slant in updating. Respondents who are biased in a topic may be less willing to update and revise their news quiz answers in certain cases and more willing to revise in others. Consider the following mutually exclusive cases for biased respondents:

(i) *Motivated state:* The initial answer of the respondent in a news topic is bias-inconsistent, and the observed information signal is bias-consistent.[44]
(ii) *Counter-motivated state:* The initial answer of the respondent is bias-consistent, and the observed information signal is bias-inconsistent.

Motivated updating means that a biased respondent is more responsive to a bias-consistent information signal than to a bias-inconsistent signal; that is, respondents are more likely to revise their assessment in the motivated case than in the counter-motivated case. To analyze whether respondents exhibit motivated updating when they are biased, we follow an approach that is similar to our analysis of motivated reasoning. In particular, we compute for each individual the share of updated answers in the motivated state and the counter-motivated state.

Table 10 presents panel regression estimates in which the dependent variable is the share of updated answers for each participant in the motivated case and the counter-

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[43]See among others Eil and Rao, 2011; Zimmermann, 2020; and Mobius et al., 2022.
[44]Recall that we analyze updating only in cases where the initial answer of the respondent is inconsistent with the observed information signal.

Table 10: Motivated updating

	(1)	(2)	(3)	(4)
Motivated	0.036***	0.036***	0.036***	0.036***
	(0.008)	(0.008)	(0.008)	(0.008)
Overconfidence	0.002	0.001	0.002	0.002
	(0.002)	(0.002)	(0.003)	(0.003)
IQ_total			0.012***	0.012***
			(0.003)	(0.003)
Education			-0.007	-0.007
			(0.008)	(0.008)
Quiz score			-0.020	0.002
			(0.066)	(0.072)
Consistent				-0.003
				(0.004)

Notes: Observations = 4,980 (2,490 × 2 types of updating). Table reports the results of panel regressions. Motivated is a dummy variable, illustrating the role of motivated updating (it equals 1 if the share of updating concerns case (i) described in the main text and 0 otherwise). The regression specification in each column is the same as in the respective column of Table 9: Column 1 involves no controls or fixed effects. Columns 2, 3, and 4 involve country and survey month fixed effects. Columns 3 and 4 involve in addition the full set of controls. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

motivated case, and the regression specifications follow the structure in Table 9, Columns 1-4, except for the addition of a dummy variable called "Motivated" (= 1 in the motivated state). According to Table 10, the magnitude of motivated updating is 3.6% in every specification, which is highly statistically significant (this means that the likelihood of updating decreases by more than 11% in the counter-motivated state). Consistent with Table 9, the IQ score has a positive effect on updating.

In Section 5.3, we found that cognitive ability has no effect on the average magnitude of motivated reasoning, but when disaggregated by topic, motivated reasoning increases in educational attainment in science. We now explore the effect of cognitive ability on motivated updating by topic. For this analysis, we define motivated updating as the difference between the respective share of updating in the motivated state and the counter-motivated state for each respondent in each topic. We find that motivated updating increases in the IQ score in science. The coefficient is large, but marginally significant, possibly because we are down to less than a quarter of the data, at 789 observations, due to several data restrictions mentioned above. This result is once again consistent with the idea that science attitudes are a more vital component of the identity of respondents with a higher cognitive ability.[45]

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[45]Another method to gauge the effect of cognitive ability on motivated updating is using the panel regression approach with the specification in Column 4 of Table 10, interacting the dummy variable "Motivated" with the IQ score and educational attainment, similar to our discussion in Section 5.2 (see Footnote 38). We obtain a similar but stronger result in this regression: the IQ score is positively associated with motivated updating in science, which is significant at the 5% level, and the coefficient of the interaction term is 1.5%,

Table 11: Effect of cognitive ability on motivated updating on the aggregate and disaggregated by theme

	All Themes	Science	Climate Change	Immigration	Inequality
IQ score	0.007**	0.014*	0.002	0.002	0.003
	(0.003)	(0.007)	(0.006)	(0.007)	(0.010)
education	0.002	-0.031	-0.011	0.012	-0.010
	(0.009)	(0.021)	(0.019)	(0.021)	(0.030)
Observations	2490	789	1055	798	397

Notes: Dependent variable is motivated updating on the aggregate or in a news theme, defined here as the difference between the respective share of updated answers in case (i) and case (ii) described in the main text. Table reports the coefficients of IQ score and educational attainment in regressions by theme or on the aggregate using the specification in Column 4 of Table 9. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

6   Concluding Remarks

An increasingly abundant circulation of fake news news discernment both a challenge and a crucial skill for citizens to navigate complex societal topics, such as climate change, immigration, and science and public health. A complicating factor is that these societal challenges have been politicized. Therefore, a combination of cognitive, psychological, and motivated mechanisms must be considered to better understand news discernment in societally important, but politicized and complex topics.

We find that both IQ and educational attainment strongly increase news discernment on the aggregate. The effect of most other respondent characteristics are either of second order in magnitude or insignificant in explaining the average ability to sort fact from fiction. These findings may seem to counter the emphasis put on informational inequality along demographic and socioeconomic lines by Angelucci and Prat (2024). However, our findings complement theirs because a large literature has demonstrated that variation in IQ is associated with inequalities. In particular, many studies suggest that the development of a child's IQ is associated with family socioeconomic status and parental investments, that the negative effect of low SES on IQ grows over time, and that (early) interventions can have sustained benefits (see for example Turkheimer et al. (2003), Heckman (2006), Cunha et al. (2006), Cunha, Heckman, and Schennach (2010), Kendler et al. (2015), Stumm and Plomin (2015), Tucker-Drob and Bates (2016), Heckman et al. (2017), Sauce and Matzel (2018), and the references therein). See also Footnote 5 on the malleability of IQ.

There are two major caveats to the effect of IQ and educational attainment we document. First, IQ and educational attainment are not the only major factors that influence

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similar to the coefficient of the IQ score in Table 11. We show in Table A15 in Online Appendix A.3 that different panel regression specifications generate the same conclusion about the effect of the IQ score on motivated updating in science.

the ability to sort fact from fiction. The magnitude of motivated reasoning we document is sizeable and highly significant. Angelucci and Prat (2024) find in the context of daily US political news that the effect of motivated reasoning is very limited and smaller than the effect of demographic and socioeconomic variables (including education). Pennycook and Rand (2019) conclude that people fall for fake news due to a failure to think, rather than motivated reasoning. Our news quiz covers various, politicized themes that are relatively complex, which seems to breed motivated decision making. Indeed, our model makes this prediction if we assume that $C(q)$ is a function of the difficulty of the topic. For example, if two topics, 1 and 2, are associated with respective functions $C_1(q) > C_2(q)$ such that for all $q > 0.5$ (because topic 1 is more complex), then the average magnitude of motivated reasoning is higher in topic 1 than in topic 2.

Second, we find that the effect of cognitive ability is surprisingly heterogeneous as a determinant of the magnitude of motivated reasoning. In particular, we document a positive relationship between cognitive ability and motivated decision making in the science theme, which consists of news items in the intersection of science, public health, and conspiracy theories. This suggests that individuals with higher cognitive ability could perhaps benefit from exercising humility and open-mindedness, especially in some topics. Further research is necessary to elucidate the exact pathways that link cognitive ability to increased or decreased motivated reasoning. Further research is also necessary to investigate how the mechanisms we document here are associated with behavior and outcomes, for example sharing news with others and its impact on the recipients.

Overall, our findings suggest that in the fight against misinformation, later-stage interventions, such as fact-checking and nudges, should be combined with early interventions to promote cognitive skills and critical thinking, and strong institutions that elicit trust.

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A   Additional Data Analysis

A.1   Additional Analysis for Hypothesis 1

Table A1: Effect of cognitive ability on news quiz score (all coefficients)

		IQ			Education		IQ & Education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	0.012***	0.012***	0.012***				0.011***
	(0.001)	(0.001)	(0.001)				(0.001)
education				0.023***	0.026***	0.024***	0.018***
				(0.002)	(0.003)	(0.003)	(0.003)
media usage			0.002			0.010***	0.003
			(0.003)			(0.003)	(0.003)
trust			0.001			0.001	0.000
			(0.001)			(0.001)	(0.001)
age			0.001***			0.001**	0.001***
			(0.000)			(0.000)	(0.000)
female			-0.027***			-0.034***	-0.030***
			(0.005)			(0.005)	(0.005)
diverse gender			-0.004			-0.004	-0.001
			(0.029)			(0.034)	(0.029)
high-income			0.029***			0.025***	0.021***
			(0.006)			(0.006)	(0.006)
unreported income			0.007			0.005	0.005
			(0.007)			(0.007)	(0.007)
part-time			-0.006			-0.004	-0.003
			(0.007)			(0.008)	(0.007)
self-employed			0.022**			0.023**	0.021**
			(0.010)			(0.011)	(0.010)
unemployed			0.001			0.007	0.006
			(0.010)			(0.010)	(0.010)
student			0.000			0.010	0.005
			(0.013)			(0.013)	(0.013)
not working			0.001			0.013	0.010
			(0.009)			(0.009)	(0.009)
retired			-0.007			-0.008	-0.004
			(0.008)			(0.008)	(0.008)
Germany		0.017***	0.015***		0.019***	0.016***	0.019***
		(0.006)	(0.006)		(0.006)	(0.006)	(0.006)
UK		-0.002	-0.007		-0.019***	-0.024***	-0.011
		(0.006)	(0.007)		(0.007)	(0.007)	(0.007)
foreign-born			-0.011			-0.013	-0.012
			(0.013)			(0.013)	(0.012)
mother fb			-0.019*			-0.018*	-0.023**
			(0.011)			(0.011)	(0.010)
father fb			0.008			0.003	0.007
			(0.009)			(0.009)	(0.009)
median dev			0.007***			0.006***	0.006***
			(0.001)			(0.002)	(0.001)
extremist vote			-0.018***			-0.025***	-0.017**
			(0.007)			(0.007)	(0.007)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. All columns except (1) and (4) involve country and survey month fixed effects. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A2: Effect of cognitive ability on news quiz score (all respondents)

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.012***	0.012***	0.012***				0.011***
	(0.001)	(0.001)	(0.001)				(0.001)
education				0.023***	0.025***	0.024***	0.018***
				(0.002)	(0.002)	(0.003)	(0.003)
media usage			0.001			0.009***	0.003
			(0.003)			(0.003)	(0.003)
trust			-0.000			-0.000	-0.001
			(0.001)			(0.001)	(0.001)
age			0.001***			0.001***	0.001***
			(0.000)			(0.000)	(0.000)
female			-0.028***			-0.033***	-0.031***
			(0.004)			(0.004)	(0.004)
diverse gender			-0.009			-0.006	-0.006
			(0.027)			(0.031)	(0.027)
high-income			0.029***			0.026***	0.021***
			(0.005)			(0.005)	(0.005)
unreported income			0.005			0.004	0.002
			(0.006)			(0.006)	(0.006)
part time			-0.004			-0.001	-0.001
			(0.007)			(0.007)	(0.007)
self-employed			0.021**			0.021**	0.020**
			(0.010)			(0.010)	(0.010)
unemployed			0.007			0.013	0.013
			(0.010)			(0.010)	(0.010)
student			0.003			0.014	0.007
			(0.012)			(0.012)	(0.012)
not working			0.001			0.013	0.010
			(0.008)			(0.009)	(0.009)
retired			-0.004			-0.006	-0.003
			(0.007)			(0.007)	(0.007)
Germany		0.014**	0.011**		0.015***	0.012**	0.016***
		(0.005)	(0.005)		(0.005)	(0.005)	(0.005)
UK		0.000	-0.005		-0.015**	-0.021***	-0.008
		(0.006)	(0.006)		(0.006)	(0.006)	(0.006)
foreign-born			-0.006			-0.008	-0.007
			(0.012)			(0.012)	(0.012)
mother fb			-0.023**			-0.022**	-0.025**
			(0.010)			(0.010)	(0.010)
father fb			0.003			-0.001	0.002
			(0.009)			(0.009)	(0.009)
median dev			0.008***			0.006***	0.007***
			(0.001)			(0.001)	(0.001)
extremist vote						-0.024***	-0.018***
						(0.006)	(0.006)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. All columns except (1) and (4) involve country and survey month fixed effects. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A3: Effect of cognitive ability on science theme quiz score

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.005*** (0.001)	0.005*** (0.001)	0.007*** (0.002)				0.006*** (0.002)
education				0.001 (0.004)	0.004 (0.005)	0.012** (0.005)	0.008* (0.005)
media usage			0.007 (0.006)			0.011* (0.006)	0.008 (0.006)
trust			-0.000 (0.002)			-0.001 (0.002)	-0.001 (0.002)
age			0.002*** (0.000)			0.002*** (0.000)	0.002*** (0.000)
female			0.007 (0.008)			0.003 (0.008)	0.005 (0.008)
diverse gender			0.144*** (0.054)			0.144*** (0.055)	0.146*** (0.055)
high income			-0.007 (0.010)			-0.008 (0.010)	-0.010 (0.010)
unreported income			-0.005 (0.012)			-0.006 (0.012)	-0.006 (0.012)
part-time			0.018 (0.014)			0.019 (0.014)	0.020 (0.014)
self-employed			0.050*** (0.018)			0.051*** (0.019)	0.050*** (0.018)
unemployed			-0.003 (0.020)			-0.000 (0.020)	-0.001 (0.020)
student			-0.009 (0.025)			-0.004 (0.025)	-0.007 (0.025)
not working			0.008 (0.016)			0.014 (0.017)	0.012 (0.017)
retired			0.008 (0.014)			0.008 (0.014)	0.009 (0.014)
Germany		0.012 (0.010)	0.002 (0.010)		0.011 (0.010)	0.002 (0.010)	0.004 (0.010)
UK		-0.020* (0.012)	-0.032** (0.013)		-0.026** (0.012)	-0.041*** (0.013)	-0.034*** (0.013)
foreign-born			-0.049** (0.024)			-0.050** (0.024)	-0.049** (0.024)
mother fb			0.006 (0.021)			0.006 (0.020)	0.004 (0.021)
father fb			0.015 (0.017)			0.012 (0.017)	0.014 (0.017)
median dev			0.000 (0.003)			-0.000 (0.003)	-0.000 (0.003)
extremist vote			0.002 (0.013)			-0.002 (0.013)	0.003 (0.013)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A4: Effect of cognitive ability on immigration theme quiz score

| | | IQ | | | Education | | IQ & Education |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	0.016*** (0.001)	0.017*** (0.001)	0.016*** (0.001)				0.015*** (0.001)
education				0.031*** (0.004)	0.027*** (0.005)	0.024*** (0.005)	0.015*** (0.005)
media usage			-0.002 (0.006)			0.009 (0.006)	-0.001 (0.006)
trust			0.003 (0.002)			0.003 (0.002)	0.002 (0.002)
age			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)
female			-0.063*** (0.008)			-0.070*** (0.008)	-0.065*** (0.008)
diverse gender			-0.103* (0.055)			-0.104* (0.055)	-0.100* (0.054)
high-income			0.028*** (0.010)			0.026** (0.010)	0.021** (0.010)
unreported income			-0.000 (0.012)			-0.002 (0.012)	-0.003 (0.012)
part time			0.003 (0.014)			0.003 (0.014)	0.005 (0.014)
self employed			0.030 (0.018)			0.031* (0.019)	0.029 (0.018)
unemployed			0.019 (0.019)			0.025 (0.019)	0.024 (0.019)
student			0.021 (0.025)			0.031 (0.025)	0.023 (0.025)
not working			0.016 (0.016)			0.027 (0.017)	0.024 (0.016)
retired			0.005 (0.013)			0.001 (0.014)	0.006 (0.013)
Germany		0.010 (0.010)	0.008 (0.010)		0.010 (0.010)	0.007 (0.010)	0.012 (0.010)
UK		0.074*** (0.012)	0.069*** (0.012)		0.051*** (0.012)	0.045*** (0.013)	0.064*** (0.012)
foreign-born			0.022 (0.024)			0.020 (0.025)	0.021 (0.024)
mother fb			-0.035* (0.021)			-0.032 (0.021)	-0.038* (0.021)
father fb			0.012 (0.018)			0.006 (0.018)	0.011 (0.018)
median dev			0.011*** (0.003)			0.010*** (0.003)	0.010*** (0.003)
extremist vote						-0.033*** (0.013)	-0.022* (0.012)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A5: Effect of cognitive ability on climate theme quiz score

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.016*** (0.001)	0.015*** (0.002)	0.013*** (0.002)				0.011*** (0.002)
education				0.037*** (0.004)	0.041*** (0.005)	0.030*** (0.005)	0.024*** (0.005)
media usage			-0.004 (0.006)			0.005 (0.006)	-0.001 (0.006)
trust			0.002 (0.002)			0.001 (0.002)	0.000 (0.002)
age			-0.000 (0.000)			-0.001 (0.000)	-0.000 (0.000)
female			-0.020** (0.009)			-0.027*** (0.009)	-0.024*** (0.008)
diverse gender			0.040 (0.073)			0.042 (0.080)	0.045 (0.075)
high-income			0.058*** (0.010)			0.051*** (0.010)	0.047*** (0.010)
unreported income			0.016 (0.013)			0.013 (0.013)	0.012 (0.013)
part time			-0.037*** (0.014)			-0.035** (0.014)	-0.034** (0.014)
self employed			-0.005 (0.021)			-0.006 (0.021)	-0.007 (0.020)
unemployed			-0.009 (0.021)			-0.001 (0.021)	-0.002 (0.021)
student			0.020 (0.023)			0.030 (0.023)	0.024 (0.023)
not working			-0.024 (0.017)			-0.010 (0.017)	-0.013 (0.017)
retired			-0.029** (0.014)			-0.031** (0.014)	-0.028** (0.014)
Germany		0.028*** (0.010)	0.033*** (0.010)		0.033*** (0.010)	0.036*** (0.011)	0.039*** (0.010)
UK		0.005 (0.012)	0.012 (0.013)		-0.016 (0.012)	-0.009 (0.012)	0.005 (0.013)
foreign-born			-0.006 (0.022)			-0.008 (0.022)	-0.007 (0.022)
mother fb			-0.037** (0.017)			-0.037** (0.017)	-0.041** (0.017)
father fb			0.018 (0.017)			0.012 (0.016)	0.016 (0.016)
median dev			0.012*** (0.003)			0.011*** (0.003)	0.011*** (0.003)
extremist vote						-0.037*** (0.014)	-0.029** (0.014)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A6: Effect of cognitive ability on inequality theme quiz score

	(1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.016***	0.015***	0.014***				0.013***
	(0.002)	(0.002)	(0.002)				(0.002)
education				0.036***	0.039***	0.035***	0.028***
				(0.006)	(0.006)	(0.006)	(0.007)
media usage			0.005			0.015*	0.008
			(0.008)			(0.008)	(0.008)
trust			0.007**			0.006*	0.005*
			(0.003)			(0.003)	(0.003)
age			-0.000			-0.001	-0.000
			(0.001)			(0.001)	(0.001)
female			-0.048***			-0.057***	-0.053***
			(0.011)			(0.011)	(0.011)
diverse gender			-0.021			-0.018	-0.015
			(0.096)			(0.099)	(0.095)
high-income			0.019			0.012	0.008
			(0.013)			(0.013)	(0.013)
unreported income			-0.011			-0.013	-0.014
			(0.015)			(0.015)	(0.015)
part time			0.017			0.020	0.022
			(0.017)			(0.018)	(0.017)
self employed			0.038			0.039*	0.037
			(0.024)			(0.024)	(0.023)
unemployed			0.008			0.018	0.017
			(0.025)			(0.025)	(0.025)
student			-0.018			-0.007	-0.013
			(0.032)			(0.032)	(0.032)
not working			-0.029			-0.013	-0.016
			(0.022)			(0.022)	(0.022)
retired			0.004			0.004	0.008
			(0.018)			(0.018)	(0.018)
Germany		0.001	-0.002		0.006	0.001	0.005
		(0.013)	(0.013)		(0.013)	(0.013)	(0.013)
UK		-0.021	-0.018		-0.042***	-0.042***	-0.027*
		(0.015)	(0.016)		(0.015)	(0.016)	(0.016)
foreign-born			0.018			0.016	0.017
			(0.030)			(0.030)	(0.030)
mother fb			-0.030			-0.031	-0.035
			(0.024)			(0.024)	(0.024)
father fb			0.001			-0.004	-0.000
			(0.023)			(0.023)	(0.023)
median dev			0.004			0.004	0.004
			(0.004)			(0.004)	(0.003)
extremist vote						-0.012	-0.003
						(0.017)	(0.017)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A7: Effect of cognitive ability on neutral quiz score

| | | IQ | | | Education | | IQ & Education |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	0.011***	0.009***	0.010***				0.009***
	(0.002)	(0.002)	(0.002)				(0.002)
education				0.008	0.022***	0.028***	0.023***
				(0.007)	(0.007)	(0.007)	(0.007)
media usage			0.005			0.013	0.007
			(0.009)			(0.009)	(0.009)
trust			-0.007**			-0.007*	-0.007**
			(0.004)			(0.004)	(0.004)
age			0.003***			0.002***	0.003***
			(0.001)			(0.001)	(0.001)
female			-0.019			-0.024*	-0.022*
			(0.013)			(0.013)	(0.013)
diverse gender			-0.178***			-0.179***	-0.176***
			(0.067)			(0.065)	(0.064)
high-income			0.057***			0.049***	0.046***
			(0.015)			(0.015)	(0.015)
unreported income			0.051***			0.047**	0.046**
			(0.019)			(0.019)	(0.019)
part time			-0.030			-0.027	-0.026
			(0.021)			(0.021)	(0.021)
self employed			-0.007			-0.009	-0.010
			(0.029)			(0.029)	(0.029)
unemployed			-0.017			-0.011	-0.012
			(0.032)			(0.032)	(0.032)
student			-0.035			-0.024	-0.028
			(0.037)			(0.037)	(0.037)
not working			0.039			0.052**	0.050*
			(0.026)			(0.026)	(0.026)
retired			-0.020			-0.021	-0.018
			(0.021)			(0.021)	(0.021)
Germany		0.036**	0.033**		0.039**	0.036**	0.039**
		(0.015)	(0.016)		(0.015)	(0.016)	(0.016)
UK		-0.113***	-0.129***		-0.126***	-0.142***	-0.131***
		(0.018)	(0.019)		(0.018)	(0.019)	(0.019)
foreign-born			-0.040			-0.043	-0.042
			(0.034)			(0.034)	(0.034)
mother fb			0.005			0.007	0.004
			(0.027)			(0.027)	(0.027)
father fb			-0.025			-0.031	-0.028
			(0.025)			(0.025)	(0.025)
median dev			0.003			0.000	0.000
			(0.004)			(0.004)	(0.004)
extremist vote						-0.041**	-0.035*
						(0.021)	(0.021)

Notes: IQ score varies from 0 to 12. Educational attainment varies from 1 to 5. Baseline employment status is full-time employee. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A8: Interaction effects of cognitive ability and news theme

| | IQ | | | Education | | | IQ & Education |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	0.005***	0.004***	0.004***				0.004***
	(0.002)	(0.001)	(0.001)				(0.001)
education				0.001	0.005	0.004	0.002
				(0.005)	(0.005)	(0.005)	(0.005)
Clim × IQ score	0.011***	0.011***	0.011***				0.009***
	(0.002)	(0.002)	(0.002)				(0.002)
Immi × IQ score	0.011***	0.011***	0.011***				0.010***
	(0.002)	(0.002)	(0.002)				(0.002)
Ineq × IQ score	0.011***	0.011***	0.011***				0.009***
	(0.002)	(0.002)	(0.002)				(0.002)
Clim × education				0.036***	0.036***	0.036***	0.030***
				(0.007)	(0.006)	(0.006)	(0.006)
Immi × education				0.029***	0.029***	0.029***	0.024***
				(0.007)	(0.006)	(0.006)	(0.006)
Ineq × education				0.035***	0.035***	0.035***	0.030***
				(0.007)	(0.007)	(0.007)	(0.008)
Observations	3227	3227	3227	3227	3227	3227	3227
Controls	no	no	yes	no	no	yes	yes
Theme FE	yes	yes	yes	yes	yes	yes	yes
Month FE	no	yes	yes	no	yes	yes	yes
Country FE	no	yes	yes	no	yes	yes	yes

Notes: Table reports the results of panel regressions in which the dependent variable is the quiz score by theme for each participant. The baseline quiz score is the score in the science theme. In the interaction terms, "Immi" refers to the immigration theme, "Clim" to climate change, and "Ineq" to inequality. Columns (1) and (4) show the respective effect of the IQ measure and educational attainment with only news theme fixed effects and theme interaction terms. Columns (2) and (5) show the respective effect of the IQ measure and educational attainment on the quiz score by theme without any controls, except theme interaction terms, and country, theme, and survey month fixed effects. Columns (3) and (6) show the respective effect of the IQ measure and educational attainment on the quiz score with theme interactions, the full set of controls as well as country, theme, and survey month fixed effects. Column (7) shows the effect of the IQ measure and educational attainment jointly with theme interactions, the full set of controls, and country, theme, and survey month fixed effects. The included control variables are the same as in Table 1 in the main text. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

A.2 Additional Analysis for Hypotheses 2 and 3

Here, we produce tables with coefficients omitted in the main text.

Table A9: Effect of cognitive ability on counter-motivated news quiz score (all coefficients)

	IQ (1)	IQ (2)	(3)	(4)	Education (5)	(6)	IQ & Education (7)
IQ score	0.013***	0.013***	0.012***				0.011***
	(0.002)	(0.002)	(0.002)				(0.002)
education				0.030***	0.030***	0.022***	0.016***
				(0.005)	(0.005)	(0.006)	(0.006)
media usage			0.014*			0.006	0.012*
			(0.007)			(0.007)	(0.007)
trust			-0.008***			-0.008***	-0.007**
			(0.003)			(0.003)	(0.003)
age			-0.001			-0.000	-0.001
			(0.000)			(0.000)	(0.000)
female			0.033***			0.038***	0.035***
			(0.010)			(0.010)	(0.010)
diverse gender			-0.022			-0.026	-0.026
			(0.090)			(0.089)	(0.091)
high-income			-0.033***			-0.031***	-0.027**
			(0.012)			(0.012)	(0.012)
unreported			-0.009			-0.007	-0.007
			(0.014)			(0.014)	(0.014)
part-time			-0.006			-0.008	-0.009
			(0.015)			(0.015)	(0.015)
self-employed			-0.017			-0.017	-0.016
			(0.022)			(0.022)	(0.022)
unemployed			-0.005			-0.008	-0.008
			(0.024)			(0.024)	(0.024)
student			-0.048*			-0.057**	-0.052*
			(0.027)			(0.027)	(0.028)
not working			0.012			0.003	0.005
			(0.017)			(0.017)	(0.017)
retired			0.003			0.004	0.001
			(0.016)			(0.016)	(0.016)
Germany		-0.006	-0.006	-0.009		-0.006	-0.010
		(0.011)	(0.012)	(0.011)		(0.012)	(0.012)
UK		-0.016	-0.013	0.001		0.003	-0.010
		(0.013)	(0.014)	(0.013)		(0.014)	(0.014)
foreign-born			0.035			0.036	0.035
			(0.026)			(0.026)	(0.026)
mother fb			0.008			0.008	0.011
			(0.022)			(0.022)	(0.022)
father fb			-0.038*			-0.034*	-0.037*
			(0.020)			(0.020)	(0.020)
median dev			-0.005			-0.004	-0.004
			(0.003)			(0.003)	(0.003)
extremist vote			0.038***			0.045***	0.038***
			(0.014)			(0.014)	(0.014)

Notes: Observations = 3112. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and country and survey month fixed effects. The omitted categories for gender, income, employment status, and country are male, low-income, full-time employee, and Austria, respectively. The variables "mother fb" and "father fb" refer to the indicator variable for having a foreign-born mother and foreign-born father, respectively. See Footnote 26 for the explanation of the variable "median dev." Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A10: Effect of cognitive ability on motivated news quiz score (all coefficients)

	IQ			Education			IQ & Education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	0.012***	0.012***	0.013***				0.012***
	(0.002)	(0.002)	(0.002)				(0.002)
education				0.017***	0.019***	0.024***	0.017***
				(0.005)	(0.005)	(0.005)	(0.005)
media usage			0.013*			0.021***	0.014**
			(0.007)			(0.007)	(0.007)
trust			-0.005*			-0.005*	-0.006**
			(0.003)			(0.003)	(0.003)
age			0.001			0.000	0.001*
			(0.000)			(0.000)	(0.000)
female			-0.025**			-0.031***	-0.027***
			(0.010)			(0.010)	(0.010)
diverse gender			0.001			0.005	0.004
			(0.064)			(0.074)	(0.065)
high-income			0.008			0.005	0.001
			(0.011)			(0.011)	(0.011)
unreported income			-0.001			-0.003	-0.003
			(0.014)			(0.014)	(0.014)
		(0.107)	(0.109)		(0.106)	(0.107)	(0.107)
part-time			-0.012			-0.010	-0.009
			(0.015)			(0.015)	(0.015)
self-employed			0.061***			0.062***	0.061***
			(0.021)			(0.021)	(0.021)
unemployed			-0.004			0.000	0.000
			(0.024)			(0.023)	(0.023)
student			-0.038			-0.028	-0.033
			(0.026)			(0.027)	(0.026)
not working			0.006			0.017	0.014
			(0.018)			(0.019)	(0.019)
retired			-0.007			-0.008	-0.004
			(0.016)			(0.016)	(0.016)
Germany		0.016	0.012		0.016	0.012	0.016
		(0.011)	(0.012)		(0.012)	(0.012)	(0.012)
UK		-0.003	-0.008		-0.019	-0.025*	-0.011
		(0.013)	(0.014)		(0.013)	(0.014)	(0.014)
foreign-born			0.008			0.006	0.007
			(0.027)			(0.027)	(0.026)
mother fb			-0.053**			-0.053**	-0.056**
			(0.023)			(0.023)	(0.023)
father fb			0.031			0.026	0.029
			(0.021)			(0.021)	(0.021)
median dev			0.007**			0.006**	0.007**
			(0.003)			(0.003)	(0.003)
extremist vote			0.017			0.009	0.017
			(0.015)			(0.015)	(0.015)

Notes: Observations = 3112. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and country and survey month fixed effects. The omitted categories for gender, income, employment status, and country are male, low-income, full-time employee, and Austria, respectively. The variables "mother fb" and "father fb" refer to the indicator variable for having a foreign-born mother and foreign-born father, respectively. See Footnote 26 for the explanation of the variable "median dev." Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A11: Joint effect of cognitive ability and motivated reasoning (all coefficients)

| | IQ | | | | Education | | IQ & Education |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Motivated	0.180***	0.180***	0.180***	0.180***	0.180***	0.180***	0.180***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
IQ score	0.012***	0.013***	0.012***				0.011***
	(0.001)	(0.001)	(0.001)				(0.001)
education				0.024***	0.025***	0.023***	0.017***
				(0.004)	(0.004)	(0.004)	(0.004)
media usage			-0.001			0.007	0.001
			(0.005)			(0.005)	(0.005)
trust			0.001			0.001	0.001
			(0.002)			(0.002)	(0.002)
age			0.001**			0.000	0.001**
			(0.000)			(0.000)	(0.000)
female			-0.029***			-0.035***	-0.031***
			(0.007)			(0.007)	(0.007)
diverse gender			0.011			0.015	0.015
			(0.039)			(0.046)	(0.041)
high-income			0.020***			0.018**	0.014*
			(0.008)			(0.008)	(0.008)
unreported income			0.004			0.002	0.002
			(0.009)			(0.009)	(0.009)
part-time			-0.003			-0.001	0.000
			(0.011)			(0.011)	(0.011)
self-employed			0.039***			0.040***	0.039***
			(0.014)			(0.015)	(0.014)
unemployed			0.001			0.004	0.004
			(0.016)			(0.015)	(0.015)
student			0.005			0.014	0.009
			(0.018)			(0.018)	(0.018)
not working			-0.003			0.007	0.005
			(0.012)			(0.012)	(0.012)
retired			-0.005			-0.006	-0.003
			(0.010)			(0.010)	(0.010)
Germany	0.011		0.009	0.012		0.009	0.013
	(0.008)		(0.008)	(0.008)		(0.008)	(0.008)
UK	0.007		0.002	-0.010		-0.014	-0.001
	(0.009)		(0.010)	(0.009)		(0.010)	(0.010)
foreign-born			-0.013			-0.015	-0.014
			(0.018)			(0.018)	(0.018)
mother fb			-0.031**			-0.030**	-0.034**
			(0.015)			(0.015)	(0.015)
father fb			0.034**			0.030**	0.033**
			(0.014)			(0.014)	(0.014)
median dev			0.006***			0.005**	0.005**
			(0.002)			(0.002)	(0.002)
extremist vote			-0.011			-0.018*	-0.010
			(0.010)			(0.010)	(0.010)

Notes: Observations = 6224 (3112 × 2 types of scores). Table reports the results of panel regressions. Motivated is a dummy variable, illustrating the role of motivated reasoning in accuracy (it equals 1 if the score refers to the motivated score of a respondent and 0 otherwise). The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and fixed effects. The omitted category for employment status is full-time employee. The variables "mother fb" and "father fb" refer to the indicator variables for having a foreign-born mother and foreign-born father, respectively. See the main text and Footnote 26 for the explanation of the variable "median dev." Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A12: Joint effect of cognitive ability and motivated reasoning by theme (all coefficients)

	Science	Climate Change	Immigration	Inequality
Motivated	0.232***	0.090***	0.215***	0.289***
	(0.011)	(0.010)	(0.013)	(0.016)
IQ score	0.007***	0.013***	0.018***	0.013***
	(0.002)	(0.002)	(0.002)	(0.002)
education	0.008	0.024***	0.020***	0.029***
	(0.006)	(0.006)	(0.006)	(0.008)
media usage	0.014*	0.004	-0.004	0.008
	(0.007)	(0.008)	(0.008)	(0.009)
trust	-0.001	0.002	-0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.004)
age	0.002***	-0.001	0.001**	0.000
	(0.000)	(0.000)	(0.001)	(0.001)
female	0.003	-0.034***	-0.069***	-0.057***
	(0.010)	(0.010)	(0.011)	(0.013)
diverse gender	0.038	-0.018	-0.053	0.088
	(0.056)	(0.076)	(0.073)	(0.090)
high-income	-0.008	0.047***	0.017	-0.005
	(0.012)	(0.012)	(0.014)	(0.016)
unreported income	0.003	-0.000	0.007	-0.021
	(0.015)	(0.015)	(0.015)	(0.017)
part-time	0.016	-0.014	0.004	0.016
	(0.016)	(0.016)	(0.018)	(0.021)
self-employed	0.032	0.026	0.048*	0.045*
	(0.021)	(0.023)	(0.026)	(0.027)
unemployed	0.014	0.014	0.015	0.023
	(0.023)	(0.026)	(0.024)	(0.031)
student	-0.015	0.037	-0.001	-0.011
	(0.030)	(0.029)	(0.032)	(0.035)
not working	0.004	0.006	0.031	-0.013
	(0.019)	(0.020)	(0.019)	(0.025)
retired	-0.002	-0.014	-0.004	0.010
	(0.017)	(0.016)	(0.018)	(0.021)
Germany	0.008	0.036***	0.005	-0.006
	(0.012)	(0.012)	(0.014)	(0.015)
UK	-0.035**	0.007	0.066***	-0.045**
	(0.015)	(0.015)	(0.016)	(0.019)
foreign-born	-0.039	-0.009	0.002	0.010
	(0.028)	(0.028)	(0.034)	(0.039)
mother fb	-0.022	-0.042**	-0.040	-0.033
	(0.026)	(0.020)	(0.027)	(0.030)
father fb	0.039*	0.015	0.035	0.011
	(0.020)	(0.020)	(0.024)	(0.027)
median dev	0.004	0.009***	0.014***	0.001
	(0.003)	(0.003)	(0.003)	(0.004)
extremist vote	-0.002	-0.027*	-0.037**	-0.017
	(0.015)	(0.016)	(0.017)	(0.019)
Observations	4444	4510	3482	4406

Notes: Table reports the results of panel regressions with the full set of controls and country and survey month fixed effects in each theme. Motivated is a dummy variable, illustrating the role of motivated reasoning in accuracy (it equals 1 if the score refers to the motivated score of a respondent and 0 otherwise). Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A13: Correlates of motivated reasoning (all coefficients)

		IQ			Education		IQ & Education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQ score	-0.000	-0.000	0.001				0.001
	(0.002)	(0.002)	(0.003)				(0.003)
education				-0.013*	-0.011	0.002	0.002
				(0.007)	(0.007)	(0.008)	(0.008)
media usage			0.026**			0.027***	0.026**
			(0.010)			(0.010)	(0.010)
trust			-0.013***			-0.013***	-0.013***
			(0.004)			(0.004)	(0.004)
age			0.000			0.000	0.000
			(0.001)			(0.001)	(0.001)
female			0.008			0.008	0.008
			(0.014)			(0.014)	(0.014)
diverse gender			-0.022			-0.021	-0.021
			(0.135)			(0.136)	(0.135)
high-income			-0.025			-0.026	-0.026
			(0.017)			(0.017)	(0.017)
unreported income			-0.010			-0.010	-0.010
			(0.020)			(0.020)	(0.020)
part-time			-0.018			-0.018	-0.018
			(0.021)			(0.021)	(0.021)
self-employed			0.045			0.045	0.045
			(0.032)			(0.032)	(0.032)
unemployed			-0.009			-0.008	-0.008
			(0.036)			(0.036)	(0.036)
student			-0.086**			-0.085**	-0.085**
			(0.040)			(0.040)	(0.040)
not working			0.018			0.019	0.019
			(0.025)			(0.026)	(0.026)
retired			-0.004			-0.004	-0.003
			(0.024)			(0.024)	(0.024)
Germany		0.010	0.006		0.007	0.006	0.006
		(0.017)	(0.017)		(0.017)	(0.017)	(0.017)
UK		-0.019	-0.021		-0.018	-0.022	-0.021
		(0.019)	(0.021)		(0.019)	(0.021)	(0.021)
foreign-born			0.043			0.042	0.042
			(0.039)			(0.039)	(0.039)
mother fb			-0.045			-0.045	-0.045
			(0.033)			(0.033)	(0.033)
father fb			-0.007			-0.008	-0.008
			(0.030)			(0.030)	(0.030)
median dev			0.002			0.002	0.002
			(0.005)			(0.005)	(0.005)
extremist vote			0.055**			0.054**	0.055**
			(0.022)			(0.022)	(0.022)

Notes: Observations = 3112. Dependent variable is motivated reasoning in a news theme, defined here as the difference between the motivated score and counter-motivated score of a respondent in that theme. The regression specification in each column is the same as in the respective column of Table 1: Columns 1 and 4 involve no controls or fixed effects. Columns 2 and 5 involve only country and survey month fixed effects. Columns 3, 6, and 7 involve the full set of controls and country and survey month fixed effects. The omitted categories for gender, income, employment status, and country are male, low-income, full-time employee, and Austria, respectively. The variables "mother fb" and "father fb" refer to the indicator variable for having a foreign-born mother and foreign-born father, respectively. See Footnote 26 for the explanation of the variable "median dev." Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A14: Correlates of motivated reasoning by theme (all coefficients)

	Science	Climate Change	Immigration	Inequality
IQ score	0.007	0.007*	0.004	-0.014**
	(0.004)	(0.004)	(0.005)	(0.006)
education	0.041***	-0.009	-0.045***	-0.003
	(0.013)	(0.012)	(0.015)	(0.019)
media usage	0.038**	0.020	0.022	0.009
	(0.017)	(0.016)	(0.019)	(0.023)
trust	-0.012*	-0.016**	-0.021***	0.004
	(0.007)	(0.006)	(0.008)	(0.009)
age	-0.000	-0.001	0.002*	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
female	-0.041*	0.013	-0.012	0.088***
	(0.024)	(0.022)	(0.027)	(0.033)
diverse gender	-0.023	0.009	-0.081	0.243
	(0.198)	(0.149)	(0.259)	(0.263)
high-income	0.022	0.003	-0.019	-0.137***
	(0.028)	(0.025)	(0.032)	(0.040)
unreported income	-0.043	0.002	-0.005	-0.021
	(0.033)	(0.031)	(0.039)	(0.047)
part-time	0.020	0.031	-0.098**	-0.022
	(0.037)	(0.032)	(0.039)	(0.049)
self-employed	0.054	0.046	0.049	0.029
	(0.048)	(0.047)	(0.061)	(0.070)
unemployed	0.048	0.025	-0.124*	0.108
	(0.059)	(0.053)	(0.067)	(0.074)
student	-0.042	-0.025	-0.134	-0.060
	(0.062)	(0.064)	(0.086)	(0.092)
not working	0.048	0.025	-0.014	-0.012
	(0.045)	(0.042)	(0.052)	(0.058)
retired	0.057	0.056	-0.058	-0.049
	(0.040)	(0.036)	(0.043)	(0.055)
Germany	0.009	0.036	-0.025	-0.041
	(0.028)	(0.025)	(0.033)	(0.040)
UK	-0.014	0.023	-0.089**	-0.050
	(0.036)	(0.032)	(0.040)	(0.047)
foreign-born	0.026	0.001	0.073	-0.029
	(0.065)	(0.064)	(0.072)	(0.094)
mother fb	-0.051	-0.039	-0.139**	0.035
	(0.050)	(0.056)	(0.057)	(0.074)
father fb	0.087	0.026	-0.089*	-0.031
	(0.054)	(0.046)	(0.053)	(0.067)
median dev	-0.004	0.007	0.004	0.006
	(0.008)	(0.007)	(0.009)	(0.010)
extremist vote	-0.011	0.099***	0.136***	0.008
	(0.038)	(0.032)	(0.040)	(0.052)
Observations	2222	2255	1741	2203

Notes: Dependent variable is motivated reasoning in a news theme, defined here as the difference between the motivated score and counter-motivated score of a respondent in that theme. Table reports the coefficients of IQ score and educational attainment in regressions with the full set of controls and country and survey month fixed effects in each theme. Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

A.3 Additional Analysis for Section 5.4

Table A15: The effect of IQ score on motivated updating in the science theme

	(1)	(2)	(3)	(4)	(5)
Motivated	0.012	0.012	0.012	0.012	0.012
	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)
IQ score	0.001	0.004	0.003	0.003	0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Motivated × IQ score	0.015**	0.015**	0.015**	0.015**	0.015**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Education	0.023	0.011	0.013	0.012	0.012
	(0.018)	(0.018)	(0.019)	(0.019)	(0.019)
Motivated × education	-0.028	-0.028	-0.028	-0.028	-0.028
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Overconfidence				0.003	0.004
				(0.004)	(0.004)
Science quiz score				0.037	0.035
				(0.058)	(0.058)
Consistent					0.007
					(0.007)
Controls	no	no	yes	yes	yes
Month FE	no	yes	yes	yes	yes
Country FE	no	yes	yes	yes	yes

Notes: Observations = 1578 (789 × 2 types of updating). Table reports the results of panel regressions. Motivated is a dummy variable, illustrating the role of motivated updating (it equals 1 if the share of updating concerns case (i) described in the main text and 0 otherwise). Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

B   News Quiz Questions

Question	Text	Initial	After
1	In 2017, a prestigious demographic research organisation made a forecast on the number of children for Muslim and non-Muslim women in the EU between 2015 and 2020. According to the forecast, a typical Muslim woman in the EU has: a. 1 more child b. 3 more children	0.35	0.46
2	True or false? According to official statistics, Muhammad was the most popular first name for newborn boys in several regions of England in 2020. a. True b. False	0.44	0.53
3	True or false? According to the latest UK Census, the share of Muslim population in the UK is higher than 20%. a. True b. False	0.35	0.48
4	According to official statistics, a. 38% b. 18% of migrants in the EU born outside the EU have a low level of education (at most 8-10 years of schooling)	0.67	0.71
5	According to recent research published in a prestigious scientific journal, average sea levels increased by about a. 18 cm b. 8 cm between 1993 and 2019.	0.73	0.74
6	True or false? According to studies published in prestigious scientific journals, the melting of ancient Arctic ice may release radioactive materials and ancient microbes, and endanger human health. a. True b. False	0.63	0.69
7	A survey of top climate scientists in 2021 found that a. 82% b. 58% of them expect to see catastrophic changes in their lifetimes due to climate change.	0.39	0.50
8	In Europe, since 1990, air pollution levels and premature deaths due to air pollution have a. decreased considerably. b. remained stable.	0.31	0.45
9	A scientific report prepared for the European Parliament in 2021 states that the health effects of the high radio frequencies used in the latest mobile network technology (5G) a. have been well studied and proven to be safe. b. have not been adequately studied.	0.54	0.59
10	True or false? A recent book by a leading scientist documents that scientists in the US deliberately infected more than 1,000 people with hepatitis (from stigmatized groups, such as conscientious objectors, prison inmates, the mentally ill, and developmentally disabled adults and children) between 1942 and 1972. a. True b. False	0.61	0.66
11	True or false? According to a recent survey by the American Medical Association, around 40% of physicians believe that a cure for various forms of cancer already exists but is withheld from the public to increase healthcare industry profits. a. True b. False	0.49	0.57
12	Factual Information: Many countries used water fluoridation (adding fluoride to tap water in controlled amounts) to prevent tooth decay. Question: Is the following statement true or false? A substantial body of scientific evidence shows that water fluoridation reduces cognitive ability. a. True b. False	0.68	0.71
13	The World Bank defines "extreme poverty" as living each day on less than what £2.20 can buy in the UK. In the last 25 years, the number of people in the world living in extreme poverty substantially a. decreased b. increased.	0.16	0.30
14	According to the World Bank, about a. a quarter b. a half of the world population lives each day on less than what £7 can buy in the UK.	0.60	0.67
15	True or false? There is overwhelming scientific evidence that a gluten-free diet is healthier for the average individual. a. True b. False	0.60	0.63
16	True or false? The tallest person in recorded history is a man with a height of 2.84 m. a. True b. False	0.55	0.63
# Obs		3227	3227

marketagent.

Sample:

● Country: UK

Part 1: Warm up/ Screening

1. You are invited to participate in a study by a group of researchers from several universities. By completing this survey, you will contribute to our knowledge as a society.

   The survey consists of several parts and takes (on average) about 25 minutes. **Please read each question carefully and answer it truthfully and to the best of your ability**.

   There will be an opportunity to receive a **bonus payment** (up to **£5.40**) on top of the **base payment** during this survey. The bonus payment depends on your answers to some of our survey questions, as we will explain later. You will be compensated for your participation only if you complete the entire survey.

   Your participation in this study is voluntary, and you can withdraw from the study at any point. Your data will be stored on secured servers and will be kept confidential. Results may include summary data, but you will remain fully anonymous. If you have any questions about this study, you may contact us at edoardo.cefala@wu.ac.at.

   Thank you very much for your time and support!

   a. Yes, I would like to participate in this study and confirm that I am a citizen and resident of the UK, and I am 18 years of age or older.
   b. No, I would not like to participate. (end of survey)

2. What is your **gender**? (single choice)
   a. Male
   b. Female
   c. Other

3. What is your **age**? (single choice, input of number)
   a. <…> years

   If <18 >>> end of survey
   If >75 >>> end of survey

4. Were you **born in the UK**? (single choice)
   a. Yes (>>> Q6)
   b. No

Only respondents who were not born in the UK:

1

5. **Where** were you **born**? (single choice)
    a. France
    b. Germany
    c. India
    d. Ireland
    e. Italy
    f. Lithuania
    g. Pakistan
    h. Poland
    i. Portugal
    j. Rumania
    k. Spain
    l. USA
    m. Elsewhere

All respondents:

6. Are you a **resident of the UK**? (single choice)
    a. Yes
    b. No (end of survey)

7. In which **region** of the UK do you live? (single choice)
    a. North East
    b. North West
    c. Yorkshire and The Humber
    d. East Midlands
    e. West Midlands
    f. East of England
    g. London
    h. South East
    i. South West
    j. Wales
    k. Scotland
    l. Northern Ireland

8. Which category best describes your **highest level of education**? (single choice)
    a. Less than secondary school
    b. Secondary school up to 16 years (O-levels, CSE, GCSE, etc.)
    c. Higher or secondary or further education (A-levels, BTEC, etc.)
    d. College or university degree (BA, BSc, etc.)
    e. Post-graduate degree (MA, MSc, PhD, etc.)

9. Was your **mother born** in the **UK**? (single choice)
    a. Yes (>>> Q11)
    b. No

Mother was not born in the UK:

10. **Where** was your **mother born**? (single choice)
    a. France
    b. Germany
    c. India
    d. Ireland
    e. Italy
    f. Lithuania
    g. Pakistan
    h. Poland
    i. Portugal
    j. Rumania
    k. Spain
    l. USA
    m. Elsewhere

All respondents:

11. Was your **father born** in the **UK**? (single choice)
    a. Yes (>>> Q13)
    b. No

Father was not born in the UK:

12. **Where** was your **father born**? (single choice)
    a. France
    b. Germany
    c. India
    d. Ireland
    e. Italy
    f. Lithuania
    g. Pakistan
    h. Poland
    i. Portugal
    j. Rumania
    k. Spain
    l. USA
    m. Elsewhere

Part 2: News Quiz

All respondents:

13. In the next part of the study, you will see **16 "news items"**. For each, we ask you to choose between two answers: **one is correct and the other is not**.

In order for your choices to be most helpful to us, it is very important that you answer your best guess. **Even though you may find some of the news items difficult, it is vital for our research that you try your best and do not consult external sources or other people.** Thank you very much!

You will receive a base payment of **£1.8** for completing this study irrespective of your answers. In addition, **two "news items"** will be selected randomly to determine your **bonus payment for this part of the study**. For each item selected for payment, you will receive a bonus of **£1** if you choose the correct answer.

14. In the next screen, you will be shown the first news item. Please read it carefully and **choose the answer that you consider correct**.

   Please proceed to the next news item when you are done.

Start of random order of questions

---

15. In 2017, a prestigious demographic research organisation made a forecast on the **number of children for Muslim and non-Muslim women in the EU** between 2015 and 2020. According to the forecast, a typical Muslim woman in the EU has
   a. 1 more child
   b. 3 more children
   than a non-Muslim one. (single choice, random order of items)

16. True or false? According to official statistics, **Muhammad** was the **most popular first name** for **newborn boys** in several regions of England in 2020. (single choice)
   a. True
   b. False

17. True or false? According to the latest UK Census, the share of Muslim population in the UK is **higher than 20%**. (single choice)
   a. True
   b. False

18. According to official statistics,
   a. 38%
   b. 18%
   of **migrants in the EU born outside the EU** have a low level of education (at most 8-10 years of schooling). (single choice, random order of items)

19. According to recent research published in a prestigious scientific journal, **average sea levels increased** by about
   a. 18 cm
   b. 8 cm
   between 1993 and 2019. (single choice, random order of items)

20. True or false? According to studies published in prestigious scientific journals, the **melting of ancient Arctic ice** may release **radioactive materials and ancient microbes**, and endanger human health.
   a. True
   b. False

21. A survey of **top climate scientists** in 2021 found that
    a. 82%
    b. 58%

    of them expect to see **catastrophic changes in their lifetimes** due to **climate change**. (single choice, random order of items)

22. In Europe, **since 1990**, **air pollution levels** and **premature deaths** due to air pollution have
    a. decreased considerably
    b. remained stable

    according to recent research. (single choice, random order of items)

23. A scientific report prepared for the European Parliament in 2021 states that the **health effects** of the high radio frequencies used in the latest mobile network technology (**5G**) (single choice, random order of items)
    a. have been well studied and proven to be safe.
    b. have not been adequately studied.

24. True or false? A recent book by a leading scientist documents that **scientists in the US deliberately infected more than 1,000 people with hepatitis** (from stigmatized groups, such as conscientious objectors, prison inmates, the mentally ill, and developmentally disabled adults and children) between 1942 and 1972. (single choice)
    a. True
    b. False

25. True or false? According to a recent survey by the *American Medical Association*, around **40% of physicians** believe that a **cure** for various forms of **cancer already exists** but is **withheld** from the public to increase healthcare industry profits. (single choice)
    a. True
    b. False

26. **Factual Information:** Many countries used **water fluoridation** (adding fluoride to tap water in controlled amounts) to prevent tooth decay.

    Question: Is the following statement true or false? A substantial body of scientific evidence shows that **water fluoridation** reduces cognitive ability. (single choice)
    a. True
    b. False

27. The *World Bank* defines "extreme poverty" as living each day on less than what £2.20 can buy in the UK. In the **last 25 years**, the number of people in the **world living in extreme poverty** substantially (single choice, random order of items)
    a. decreased
    b. increased

28. According to the *World Bank*, about
    a. a quarter
    b. a half

    of the **world population** lives each day on **less than what £7** can buy in the UK. (single choice, random order of items)

29. True or false? There is overwhelming scientific evidence that a **gluten-free diet** is **healthier** for the average individual. (single choice)
    a. True
    b. False

30. True or false? The **tallest person** in recorded history is a man with a height of **2.84 m**. (single choice)
    a. True
    b. False

End of random order of questions
---

31.   Thank you for your answers!

Please give your best guess: **how many** of the 16 news items **did you answer correctly**? (input of number, min. 0 – max. 16)
    a. <…> correct

32. Now, think about **100 typical people in the UK** who saw the same news items.
Where do you think you **rank** in terms of the number of correct answers?

For example:
- If you think you did **better** than everyone else did, you should answer **1**.
- If you think you did **worse** than everyone else did, you should answer **100**. (input of number, min. 1 – max. 100)
    a. <…>

Part 3: Updating

33. In this part, you will see a "**report**" for each one of the 16 news items above. Each **report** gives you some information about the **correct answer**.

For example, consider the question: *True or false? The star of the latest Marilyn Monroe movie Blonde said that the ghost of Monroe was on the film set with her.*

The **report** for the above example will show either "**True**" or "**False**". Importantly, **reports are informative but not always correct**. The report shows the **correct answer with 75% chance** and the **wrong answer with 25% chance**.

To illustrate, the correct answer in the above example is "**True**". Therefore, the report will show:
- True in 3 out of 4 cases,
- False in 1 out of 4 cases.

Once you see each report, **you may change your initial answer or keep it**.

For this part of the study, one news item will be selected randomly for **bonus payment**. If your final answer is correct, you will receive **£1.**

Please click to see the first news item, your initial answer, and the report for that item.
    a. <Erklärungstext>

6

2 Screens pro "news item":

<u>Screen 1:</u>

In 2017, a prestigious demographic research organisation made a forecast on the **number of children for Muslim and non-Muslim women in the EU** between 2015 and 2020. According to the forecast, a typical Muslim woman in the EU has
    b.   1 more child
    c.   3 more children
than a non-Muslim one. (single choice, random order of items)

You answered "[PROG]"

To see what the **report** says click here: "See report"

Reminder: the report shows the **correct answer in 3 out of 4 cases** and the **false answer in 1 out of 4 cases.**

<u>Screen 2:</u>

In 2017, a prestigious demographic research organisation made a forecast on the **number of children for Muslim and non-Muslim women in the EU** between 2015 and 2020. According to the forecast, a typical Muslim woman in the EU has
    a.   1 more child
    b.   3 more children
than a non-Muslim one. (single choice, random order of items)

You answered "[PROG]"

The report says: "[PROG]" [PROG = correct/ green answer from block News Quiz with probability 75% and wrong answer with probability 25%]

Reminder: the report shows the **correct answer in 3 out of 4 cases** and the **false answer in 1 out of 4 cases.**

You may now change your answer above if you wish.

34. In 2017, a prestigious demographic research organisation made a forecast on the **number of children for Muslim and non-Muslim women in the EU** between 2015 and 2020. According to the forecast, a typical Muslim woman in the EU has
    a.   1 more child
    b.   3 more children
than a non-Muslim one. (single choice, random order of items)

35. True or false? According to official statistics, **Muhammad** was the **most popular first name** for **newborn boys** in several regions of England in 2020. (single choice)

a. True
    b. False

36. True or false? According to the latest UK Census, the share of Muslim population in the UK is **higher than 20%**. (single choice)
    a. True
    b. False

37. According to official statistics,
    a. 38%
    b. 18%
    of **migrants in the EU born outside the EU** have a low level of education (at most 8-10 years of schooling). (single choice, random order of items)

38. According to recent research published in a prestigious scientific journal, **average sea levels increased** by about
    a. 18 cm
    b. 8 cm
    between 1993 and 2019. (single choice, random order of items)

39. True or false? According to studies published in prestigious scientific journals, the **melting of ancient Arctic ice** may release **radioactive materials and ancient microbes**, and endanger human health.
    a. True
    b. False

40. A survey of **top climate scientists** in 2021 found that
    a. 82%
    b. 58%
    of them expect to see **catastrophic changes in their lifetimes** due to **climate change**. (single choice, random order of items)

41. In Europe, **since 1990**, **air pollution levels** and **premature deaths** due to air pollution have
    a. decreased considerably
    b. remained stable
    according to recent research. (single choice, random order of items)

42. A scientific report prepared for the European Parliament in 2021 states that the **health effects** of the high radio frequencies used in the latest mobile network technology (**5G**) (single choice, random order of items)
    a. have been well studied and proven to be safe.
    b. have not been adequately studied.

43. True or false? A recent book by a leading scientist documents that **scientists in the US deliberately infected more than 1,000 people with hepatitis** (from stigmatized groups, such as conscientious objectors, prison inmates, the mentally ill, and developmentally disabled adults and children) between 1942 and 1972. (single choice)
    a. True
    b. False

44. True or false? According to a recent survey by the *American Medical Association*, around **40% of physicians** believe that a **cure** for various forms of **cancer already exists** but is **withheld** from the public to increase healthcare industry profits. (single choice)

a. True
b. False

45. **Factual Information:** Many countries used **water fluoridation** (adding fluoride to tap water in controlled amounts) to prevent tooth decay.

    Question: Is the following statement true or false? A substantial body of scientific evidence shows that **water fluoridation** reduces cognitive ability. (single choice)
    a. True
    b. False

46. The *World Bank* defines "extreme poverty" as living each day on less than what £2.20 can buy in the UK. In the **last 25 years**, the number of people in the **world living in extreme poverty** substantially (single choice, random order of items)
    a. decreased
    b. increased

47. According to the *World Bank*, about
    a. a quarter
    b. a half

    of the **world population** lives each day on **less than what £7** can buy in the UK. (single choice, random order of items)

48. True or false? There is overwhelming scientific evidence that a **gluten-free diet** is **healthier** for the average individual. (single choice)
    a. True
    b. False

49. True or false? The **tallest person** in recorded history is a man with a height of **2.84 m**. (single choice)
    a. True
    b. False

Part 4: Raven's Progressive Matrices

50. In this part, you will be asked to solve a series of **puzzles**. Please note that **it is vital for our research that you try your best to solve each puzzle**. We will **not** be able to use the responses if participants speed through this part, since their answers may not reflect their true abilities. Therefore, **we would be very grateful if you spend time on each puzzle and answer to the best of your ability**. Thank you very much!

    Each puzzle in this part consists of eight images, with one image missing. Please **identify the missing image** that completes the pattern in each puzzle.

    For example, examine the following sequence of images:
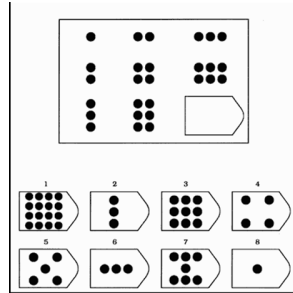
In the example above, the correct answer is image 3 as this image best completes the pattern.

There are **12 puzzles in total**. You will receive a **bonus** of **20 Pence for each correct answer**.

    a.   <Erklärungstext>

51. Please select the missing **image** that **completes the pattern below**. (single choice)
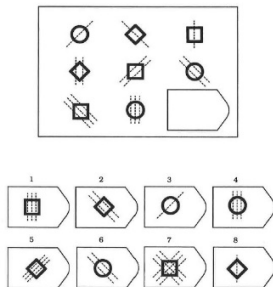
    a.   1
    b.   2
    c.   3
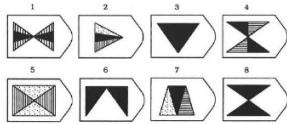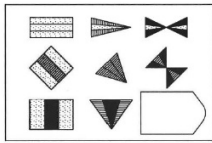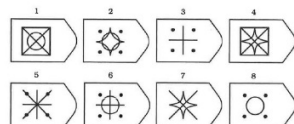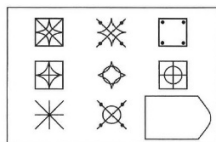   d.   4
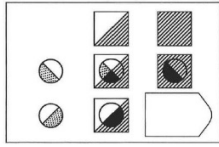   e.   5
    f.   6
    g.   7
    h.   8

52. Please select the missing **image** that **completes the pattern below**. (single choice)
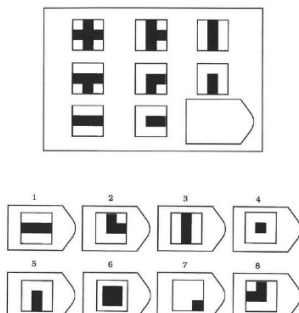
    a.   1
    b.   2
    c.   3
    d.   4

e. 5
f. 6
g. 7
h. 8

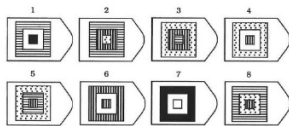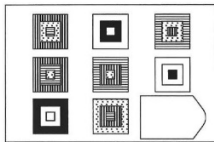53. Please select the missing **image** that **completes the pattern below**. (single choice)
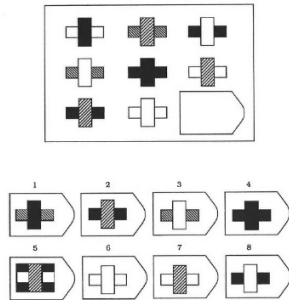
a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

54. Please select the missing **image** that **completes the pattern below**. (single choice)
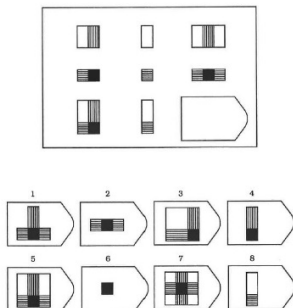
a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

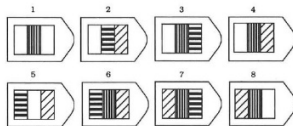55. Please select the missing **image** that **completes the pattern below**. (single choice)
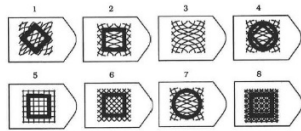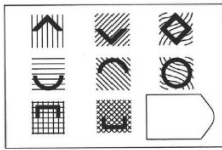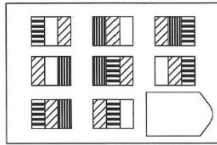
a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

56. Please select the missing **image** that **completes the pattern below**. (single choice)
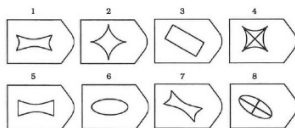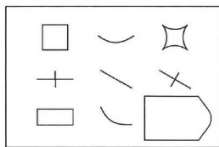
a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

57. Please select the missing **image** that **completes the pattern below**. (single choice)

a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

58. Please select the missing **image** that **completes the pattern below**. (single choice)

a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

59. Please select the missing **image** that **completes the pattern below**. (single choice)
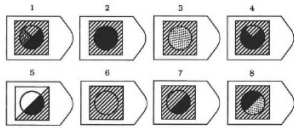
a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

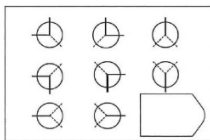60. Please select the missing **image** that **completes the pattern below**. (single choice)

a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

61. Please select the missing **image** that **completes the pattern below**. (single choice)

a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

62. Please select the missing **image** that **completes the pattern below**. (single choice)
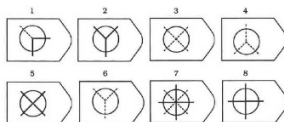
a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8

Part 5: Opinion Survey

63.   Thank you for your answers!

The questions in the next part concern **your opinions and attitudes** on various issues. These are questions for which there are no right or wrong answers.

Start of random order of questions

64. In **politics**, people sometimes talk of **"left" and "right"**. Where would you place yourself on a scale from 0 to 10, where 0 means the left and 10 means the right? (Polaritätenprofil 11-stufig)
   a.   0 = left o o o o o o o o o o o 10 = right

65. Please indicate on a scale from 0 to 10 how much you personally **trust** each of the **institutions** below. 0 means you do not trust an institution at all, and 10 means you have complete trust. (Matrix questions, random order of items)
   a.   The education system
   b.   The news media
   c.   Scientists
   d.   Politicians
   e.   Social Media

Labels:
   - 0 = no trust at all
   - 1
   - 2
   - 3
   - 4
   - 5
   - 6
   - 7
   - 8
   - 9
   - 10 = complete trust

66. Below you see **opposing views** on various issues. How would you place **your views** on this scale? (Polaritätenprofil, 7-stufig, random order of items)
   a.   Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs. O O O O O O Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent.
   b.   Immigrants take jobs away from the British. O O O O O O Immigrants do not take jobs away from the British.
   c.   I am very worried about climate change.   O O O O O O I am not at all worried about climate change.
   d.   UK's cultural life is enriched by migrants coming to live here from other countries. O O O O O O UK's cultural life is undermined by migrants coming to live here from other countries.

67. For each of the following **statements**, can you please indicate how strongly you **agree or disagree** with the statement? (Matrix question, random order of items)
   a.   The government should take measures to reduce differences in income levels.
   b.   Many of the claims about environmental threats are exaggerated.
   c.   Large differences in people's incomes are acceptable to properly reward differences in talent and effort.
   d.   Immigrants make crime problems in the UK worse.
   e.   A small secret group of people is responsible for making all major decisions in world politics.
   f.   Immigrants are generally good for the UK's economy.
   g.   The money and wealth in the UK should be more evenly distributed among people.
   h.   When jobs are scarce, employers should give priority to British people over immigrants.
   i.   We can no longer trust scientists on controversial scientific and technological issues because they depend more and more on money from industry.

Labels:
   - agree strongly
   - agree

- neither agree nor disagree
- disagree
- disagree strongly

68. In your opinion, on a scale from 1 to 6, 1 meaning "very unlikely" and 6 meaning "very likely", **how likely or unlikely** is it that the following statements are **true**? (Matrix questions, random order of items)
    a. Viruses have been produced in government laboratories to control our freedom.
    b. Climate change is for the most part caused by natural cycles rather than human activities.

Labels:
- 1 = very unlikely
- 2
- 3
- 4
- 5
- 6 = very likely

End of random order of questions

Part 6: Demographics

69. This is the final part of the survey. In this part, we will ask you a few questions about yourself.

    What is your **annual TOTAL HOUSEHOLD income before taxes**? (single choice)
    a. £ 0 – 9 999
    b. £ 10 000 – 19 999
    c. £ 20 000 – 29 999
    d. £ 30 000 – 39 999
    e. £ 40 000 – 49 999
    f. £ 50 000 – 59 999
    g. £ 60 000 – 79 999
    h. £ 80 000 – 99 999
    i. £ 100 000 – 119 999
    j. £120 000 and over
    k. No answer

70. What is your current **employment status**? (single choice)
    a. Full-time employee
    b. Part-time employee
    c. Self-employed or small business owner
    d. Unemployed and looking for work
    e. Student
    f. Not currently working and not looking for work
    g. Retiree

71. Did you **vote** in the last **UK general election** in December 2019?
    a. Yes
    b. No (>>> Q73)

Respondents who voted:

72. **Which party** did you vote for in that election? (single choice)
    a. Conservative
    b. Labour

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  c. Liberal Democrat
  d. Scottish National Party (SNP)
  e. Plaid Cymru
  f. United Kingdom Independence Party (UKIP)
  g. Green Party
  h. Brexit Party (now Reform UK)
  i. British National Party
  j. Other
  k. No answer

<u>All respondents:</u>

73. Is there a particular political **party you feel closer to** than all the other parties? (single choice)
  a. Yes
  b. No (>>> Q75)

<u>Respondents who favor a political party</u>

74. **Which** one? (single choice)
  a. Conservative
  b. Labour
  c. Liberal Democrat
  d. Scottish National Party (SNP)
  e. Plaid Cymru
  f. United Kingdom Independence Party (UKIP)
  g. Green Party
  h. Brexit Party (now Reform UK)
  i. British National Party
  j. Other
  k. No answer

<u>All respondents:</u>

75. People learn what is going on in this country and the world from various **sources**. For each of the following sources, please indicate **how often you use them to stay informed**. (Matrix question, random order of items)
  a. TV
  b. Newspapers (print or online)
  c. Radio
  d. Internet (blogs, forums, etc.)
  e. Social Media (Facebook, Twitter, etc.)

<u>Labels:</u>
- Always
- Often
- Sometimes
- Rarely
- Never

76. **Thank you very much** for your participation in our study!

You have answered X questions (out of 16) correctly the first time you took the news quiz. Two questions were randomly selected to determine your bonus payment for that part. Your bonus payment for that part is **£X**.

You answered X questions (out of 16) correctly the second time you took the news quiz. One question was randomly selected to determine your bonus payment for that part. Your bonus payment for that part is **£X**.

You answered X image puzzles correctly. Your bonus equals 0.20 × X = **£X** for that part.

In total your bonus payment will be £X. Please note that it can take up to a couple of weeks for your user account to be credited with this bonus payment.