The Limits of Motivated Reasoning When Self-Image Is Not at Stake*  

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Abstract  

Motivated reasoning is a bias in inference in which people distort their updating process in the direction of more attractive beliefs. Prior work has shown how motivated reasoning leads people to form overly “positive” beliefs that also serve to bolster one’s self-image in domains such as intelligence, prosociality, and politics. In this paper, I study whether positivity-motivated reasoning persists in domains where self-image does not play a role. In particular, I analyze whether individuals motivatedly reason to think that the world is a better place for others. Building off of the design from Thaler (2019), I conduct a large online experiment to test for positivity-motivated reasoning on issues such as cancer survival rates, others’ happiness, and infant mortality. I find no systematic evidence for positivity-motivated or negativity-motivated reasoning, and can rule out modest effects. Positivity is not a sufficient condition for motivated reasoning.

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1 Introduction

There is a common intuition in economics that people find it more attractive to believe that they are in a “good” state of the world than in a “bad” state of the world, and that this can lead them to form beliefs that are directionally distorted in favor of good states. However, tests of such over-optimism focus on states where self-image is at stake, such as about one’s future prospects, one’s ability, one’s altruism, or one’s politics (e.g. Weinstein 1980; Mobius et al. 2014; Eil and Rao 2011; Thaler 2019).

This paper argues that motivated reasoning — the distortion of new information in the direction of more attractive beliefs — is not solely about “good” and “bad” states. I run an experiment to explore how people make inferences about states of the world that are good or bad for others, and in which self-image does not play a role: positivity-motivated reasoning. I find evidence that this form of positivity-motivated reasoning does not play much of a role in inference.

In a large online experiment, I test whether people engage in positivity-motivated reasoning on five topics: the survival rate of children with leukemia, global poverty rates, annual deaths in armed conflict, others’ happiness levels, and infant mortality rates. The topics are in Table 1 below.

To identify motivated reasoning, I conduct a large online experiment that builds off of the design of Thaler (2019). That paper found evidence of motivated reasoning in political and performance domains. Forms of motivated reasoning have also been found in other self-image domains such as about one’s altruism (Exley 2015; Di Tella et al. 2015), intelligence (Mobius et al. 2014; Eil and Rao 2011), financial earnings (Mayraz 2013), and attractiveness (Eil and Rao 2011). Related theories often focus

<table>
<thead>
<tr>
<th>Topic</th>
<th>Positive Motives</th>
<th>Negative Motives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant mortality</td>
<td>Low / Decreasing</td>
<td>High / Increasing</td>
</tr>
<tr>
<td>Others’ reported happiness</td>
<td>High / Increasing</td>
<td>Low / Decreasing</td>
</tr>
<tr>
<td>Leukemia survival rate for children</td>
<td>High / Increasing</td>
<td>Low / Decreasing</td>
</tr>
<tr>
<td>Global poverty rate</td>
<td>Low / Decreasing</td>
<td>High / Increasing</td>
</tr>
<tr>
<td>Deaths in armed conflicts</td>
<td>Low / Decreasing</td>
<td>High / Increasing</td>
</tr>
<tr>
<td>Latitude of US</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

Table 1: The list of topics and positivity motives in the experiment. On the computer, each topic is a hyperlink that links to the exact question wording in Appendix B.
on image-relevant settings or treat motivated beliefs as a form of utility (e.g. Kunda 1990; Benabou and Tirole 2002; Brunnermeier and Parker 2005).

The main result in this paper is that – across several settings in which self-image is not relevant – there is no evidence for positivity- or negativity-motivated reasoning. I show that, aggregating across these questions, even modest effects can be ruled out. In fact, by comparing the magnitude of positivity-motivated reasoning to results in Thaler (2019), we can rule out an effect of positivity or negativity that is half as large as politically-driven or performance-driven motivated reasoning. This evidence shows that positivity, by itself, is insufficient for motivated reasoning.

The second result is that there is no evidence that subjects’ current beliefs are reflective of past positivity-motivated reasoning. That is, subjects whose beliefs are overly positive are no more likely to engage in positivity-motivated reasoning in this experiment. This suggests that there is limited heterogeneity in subjects’ positivity-motivated reasoning. Relatedly, there are not substantial differences in motivated reasoning by demographic factors like gender, education, or income.

The third result is that people do not expect to see evidence for positivity-motivated reasoning, but do expect positivity to affect happiness. In a separate survey, I ask participants what they expect the direction of motivated reasoning to be about positivity, politics, and own performance. While the majority of participants expect others to engage in pro-party and pro-performance motivated reasoning, they are similarly likely to expect to see positivity-motivated reasoning, negativity-motivated reasoning, or no notable difference. Yet a clear majority of participants expect positive news to make people happier.

Taken together, these results are consistent with the notion that motivated reasoning is not only driven by belief-based utility. Subjects may attain higher utility by learning that the world is good for other people, and yet not systematically distort their inference process in favor of these beliefs. That is, the beliefs that people find more attractive do not necessarily make them happier. Rather, it may be limited to belief-based utility that relates to one’s self-image.

The rest of the paper proceeds as follows: Section 2 discusses the main theory and experimental design that identifies motivated reasoning, adapted from Thaler (2019). Section 3 discusses the data. Section 4 presents the main experimental results. Section 5 discusses interpretations of the main experiment and presents survey evidence about what people expect about others’ behavior and utility. Section 6 concludes and proposes directions for future work. The appendices provide a table that is omitted from the main text, and list the exact questions and pages that subjects see.
2 Theory and Experimental Design

2.1 Theory and Predictions

The theory of motivated reasoning follows Thaler (2019). Further details are in that paper. When a motivated-reasoning agent infers about the probability that an event is true (T) or false (¬T), with prior \( P(T) \), the agent forms his posterior by incorporating prior, likelihood, and a motivated beliefs term:

\[
\frac{P(T|x)}{P(T)} \propto P(T) \cdot P(x|T) \cdot M(T)^{\varphi(x)},
\]

We take log odds ratios to attain the additive form:

\[
\logit P(T|x) = \logit P(T) + \log \left( \frac{P(x|T)}{P(x|\neg T)} \right) + \varphi(x)(m(T) - m(\neg T)).
\]

(1)

The motivated reasoner acts as if he receives both the actual signal \((x)\) and a signal whose relative likelihood corresponds to how much he is motivated to believe the state is \(T\). \(m(T) : \{T, \neg T\} \rightarrow \mathbb{R}\) is denoted the motive function. The weight put on this signal is \(\varphi(x) \geq 0\), called susceptibility. When \(\varphi(x) = 0\), the agent is Bayesian; when \(\varphi(x) > 0\), the agent motivatedly reasons.

This paper will assume \(\varphi(x) > 0\) for the particular information structure in the experiment below, and back out \(m(T) - m(\neg T)\) from the inference process. We will be interested in the psychology of the motive function. In this paper, either \(T\) will correspond to positivity (the world being a better place) and \(\neg T\) to negativity (the world being a worse place), or vice versa.

The experiment provides people with not-obviously-uninformative signals about the veracity of news sources. To fix ideas, consider the following question, taken verbatim from the experiment:

\textit{Acute Myeloid Leukemia (AML) is a devastating illness in which cancerous cells emerge in the bone marrow, invade the blood stream, and may spread to the rest of the body. Tragically, hundreds to thousands of children under the age of 15 are diagnosed with AML each year; it is one of the most common cancers among children. Of children under the age of 15 who are diagnosed with AML, what percent survive for at least 5 years?}

This is a question for which higher-valued states are more positive. The main test of
motivated reasoning then involves three steps:

1. **Beliefs**: Subjects are asked to guess the answers to questions like the one above. Importantly, they are asked and incentivized to guess their median belief (i.e. such that they find it equally likely for the answer to be above or below their guess).

2. **News**: Subjects receive a binary message from one of two randomly-chosen news sources: True News and Fake News. The message from True News is always correct, and the message from Fake News is always incorrect. This is the main (within-subject) treatment variation.

   The message says either “The answer is **greater than** your previous guess of [previous guess].” or “The answer is **less than** your previous guess of [previous guess].” Note that the exact messages are different for each subject since subjects have different guesses. These customized messages are designed so that they have the same subjective likelihood of occurring.

   For the cancer question above, “greater than” corresponds to Positive news and “less than” to Negative news.

3. **Assessment**: After receiving the message, subjects assess the probability that the message came from True News using a scale from 0/10 to 10/10, and are incentivized to state their true belief. This news veracity assessment is the main outcome measure. The effect of variation in news direction on veracity assessments is the primary focus for much of this paper.

   More formally, consider an agent with prior $F(\theta)$ about a state in $\Theta$. Denote by $\mu \equiv F^{-1}(1/2)$ the median of $F(\theta)$. For simplicity, we assume that $F$ has no atom at $\mu$ and that $P(\mu = \theta) = 0$. That is, the agent believes that the answer has probability zero of being exactly equal to $\mu$, and the true probability is indeed zero.\(^1\)

   The agent receives a source that is either from True News ($T$) or Fake News ($\neg T$). Both report one of two binary messages $G$ or $L$: “The answer $\theta$ is greater than your median $\mu$” or “The answer $\theta$ is less than your median $\mu$.” Prior beliefs $P(T)$ are fixed, and $\log \left( \frac{P(G|T)}{P(G|\neg T)} \right) = \log \left( \frac{P(L|T)}{P(L|\neg T)} \right) = 0$ by definition of a median.

<table>
<thead>
<tr>
<th></th>
<th>$\theta &gt; \mu$</th>
<th>$\theta &lt; \mu$</th>
</tr>
</thead>
<tbody>
<tr>
<td>True News sends</td>
<td>$G$</td>
<td>$L$</td>
</tr>
<tr>
<td>Fake News sends</td>
<td>$L$</td>
<td>$G$</td>
</tr>
</tbody>
</table>

   The agent has a prior about the news source $p \equiv P(T)$ that does not depend on $\theta$, and infers about $P(T)$ given the message received.

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\(^1\)In this experiment, zero answers are correct, so the assumption appears reasonable.
We can now look at how a motivated reasoner updates his beliefs about the news source after receiving $G$:

$$
\logit P(T|G) = \logit P(T) + \log \left( \frac{P(G|T)}{P(G|\neg T)} \right) + \varphi (m(\theta|\theta > \mu) - m(\theta|\theta < \mu)) \\
= \logit p + \varphi (m(\theta|\theta > \mu) - m(\theta|\theta < \mu)).
$$

Therefore, if $m$ is strictly monotonically increasing in $\theta$, then $P(T|G) > P(T|L)$, and if $m$ is strictly monotonically decreasing in $\theta$, then $P(T|G) < P(T|L)$. By contraposition, if $P(T|G) = P(T|L)$, then $m$ is neither strictly monotonically increasing nor decreasing in $\theta$.

Additionally, if $m$ is monotonic in $\theta$ for all agents but there is heterogeneity in its slope, then the average slope may be zero because some agents have upward-sloping motives ("positivity motives") and some agents have downward-sloping motives ("negativity motives"). In this case, if agents have received information drawn from the same distribution in the past, then their current beliefs will reflect their motives. A positivity-motivated reasoner will be more likely to hold a belief that $\mu > \theta$, and a negativity-motivated reasoner with a decreasing motive function will be more likely to hold a belief that $\mu < \theta$. This implies that an agent who believes $\mu > \theta$ is more likely to believe that $P(T|G) > P(T|L)$ in the experiment, and an agent who believes $\mu < \theta$ is more likely to believe that $P(T|G) < P(T|L)$ in the experiment.

That is, if motive direction is heterogeneous, subjects will trust Fake News more than True News. For further details, see Thaler (2019). By contraposition, if subjects trust Fake News and True News equally, then there is no evidence for heterogeneity in positivity- versus negativity-motivated reasoning.

### 2.2 Experimental Details

The experiment follows the structure and incentive scheme of Thaler (2019), which contains further details. Screenshots of a version of each page in the experiment, including instructions and scoring rules, can be found in Appendix C.

Subjects first see an Introduction page for consent, then a Demographics page, and then the instructions and point system for Question pages. On each Question page, subjects are asked and incentivized to give a median guess, a lower bound (equal to their 25th-percentile belief), and an upper bound (equal to their 75th-percentile belief). The median is incentivized using a linear scoring rule, and the bounds using piecewise-linear scoring rules. For details, see Appendix C.

Next, subjects see the instructions and point system for News pages. On each News page, subjects see the message that says whether the answer is greater than or less than
their previous median guess, and are asked and incentivized to assess the probability that the message comes from True News versus Fake News using a quadratic loss scoring rule. Subjects are told that the ex ante probability of True News is 1/2. They are also asked to give an updated median guess after seeing the message, and are again incentivized with a linear scoring rule. For details, see Appendix C.

Subjects see News pages after their corresponding Question page, in the order: Question 1, News 1, Question 2, News 2, .... At the end of the experiment, they see a Results page with details on all the correct answers, points scored, and money earned.

At the end of the experiment, subjects’ points earned on each part of the experiment are averaged. Subjects are paid a $3 show-up fee and have a probability of winning a $10 bonus equal to their average score divided by 1000. This probabilistic bonus is designed to eliminate potential hedging and risk-aversion confounds.

3 Data

The experiment was conducted on Amazon’s Mechanical Turk (MTurk) platform. MTurk is an online labor marketplace in which participants choose “Human Intelligence Tasks” to complete. MTurk has become a very popular way to run economic experiments (e.g. Horton, Rand, and Zeckhauser 2011; Kuziemko et al. 2015), and Levay, Freese, and Druckman (2016) find that participants generally tend to have more diverse demographics than students in university laboratories on dimensions like age and politics. The experiment was coded using oTree, an open-source software based on the Django web application framework developed by Chen, Schonger, and Wickens (2016).

Wave 1 was conducted on July 8-9, 2019, and asked about the leukemia survival rates question. Wave 1 additionally included political and performance questions that were part of a separate experiment. Wave 2 was conducted on October 1-2, 2019, and asked about the other four questions. Both waves were offered to MTurk workers currently living in the United States who had not previously taken one of my motivated reasoning experiments. 522 participants from Wave 1 and 508 participants from Wave 2 passed simple attention and comprehension checks.\(^2\) Wave 1 also included politicized questions and tested a debiasing treatment that is unrelated to this paper; only participants in the control group are included here, and only observations on the positivity questions are kept.

Subjects in Wave 1 answer one question about positivity; subjects in Wave 2 answer

\(^2\)In order to pass these checks, subjects needed to perfectly answer the comprehension check question in Appendix B (by giving a correct answer, correct bounds, and answering the news assessment with certainty). In addition, many questions had clear maximum and minimum possible answers (such as percentages, between 0 and 100). Subjects were dropped if any of their answers did not lie within these bounds.
four questions about positivity and one neutral question. There are a total of 3,062
guesses to these questions. Zero guesses were exactly correct.\(^3\) There are therefore a
total of 3,062 news assessments. 2,554 assessments are Positive or Negative, and 508
assessments are on the neutral topic.

The balance table for the Positive / Negative treatment is in Appendix A.1. Since
this randomization is within subject, treatments are expected to be balanced across
demographics. The overall shares of Positive and Negative are not statistically signifi-
cantly different, indicating that there is not substantially different attrition.

4 Results

4.1 Raw Data

This subsection shows that the raw data does not support positivity- or negativity-
motivated reasoning, and the following subsection shows the relevant regressions.

The mean assessment of Positive news is 57.7 percent (s.e. 0.7 percent) and the
mean assessment of Negative news is 58.5 percent (s.e. 0.8 percent).\(^4\) The difference
between these is -0.7 percentage points; this point estimate is statistically insignificantly
different from zero \(p = 0.457\).

Figure 1 shows the empirical distributions of assessments for Positive and Negative
news, which substantially overlap.

Likewise, there is no evidence that current beliefs are reflective of motivated beliefs
on these questions. The mean assessment of Error-Accentuating news is 58.0 percent
(s.e. 0.7 percent) and the mean assessment of Error-Mitigating news is 58.2 percent
(s.e. 0.8 percent). The difference between these is -0.3 percentage points; this point
estimate is statistically insignificantly different from zero \(p = 0.800\).

Figure 2 shows the empirical distributions of assessments for True News and Fake
News, which substantially overlap.

4.2 Main Specifications

Due to subjects in the two waves seeing different questions, the main specification is
between subjects. In particular, subjects in Wave 1 only see one positivity-related
question, so the within-subject test essentially ignores this sample.

In particular, the main specification for positivity-motivated reasoning is in Table 2,
column 1. The regression looks at assessments \(a\) for subject \(i\), question topic \(q\), and

\(^3\)This suggests, reassuringly, that subjects did not look up the correct answers.
\(^4\)All standard errors are clustered at the individual level.
Figure 1: Histogram of Perceived Veracity of Positive and Negative News

Figure 2: Histogram of Perceived Veracity of True and Fake News About Positivity

Notes: Only Positive / Negative news observations, as defined in Table 1. Messages are customized so that Bayesians give the same assessment for Positive and Negative news.
round $r$ with fixed effects for $q$ and $r$ when all news is Positive or Negative:

$$a_{iqr} = \alpha + \beta \cdot 1(Pro-Party)_{iqr} + \gamma z_i + \delta F_{Eq} + \zeta F_{Er} + \epsilon_{iqr}$$

$z_i$ is a vector of controls. The controls used are age, an indicator for political party, an indicator for race, an indicator for gender, log(income), years of education, and an indicator for whether the subject is part of a religious group.

Column 2 uses the within-subject design; the standard error is larger, but the coefficient does not substantially change. In order to test whether there are differences compared to Neutral news, column 3 includes indicators for both Positive (versus Neutral) news and Negative (versus Neutral) news.

Columns 4 and 5 regress assessments on an indicator for True News (as opposed to Fake News), with and without controls for positivity. Recall from Section 2 that this measures whether directional errors in current beliefs are partly explained by past motivated reasoning on these topics, and therefore whether we should expect much heterogeneity in motive direction.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive News</td>
<td>-0.005</td>
<td>-0.017</td>
<td>0.007</td>
<td>-0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.010)</td>
<td></td>
</tr>
<tr>
<td>Negative News</td>
<td>0.012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>True News</td>
<td></td>
<td></td>
<td></td>
<td>-0.002</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.010)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Neutral News</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Question FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Round FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Subject controls</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Subject FE</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>Observations</td>
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<td>3062</td>
<td>2554</td>
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<tr>
<td>$R^2$</td>
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<td>0.49</td>
<td>0.03</td>
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</tr>
<tr>
<td>Mean</td>
<td>0.581</td>
<td>0.581</td>
<td>0.577</td>
<td>0.581</td>
<td>0.581</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: OLS, errors clustered at subject level. Neutral News indicates that Positive / Negative news assessments are compared to assessments on Neutral topics. These classifications are defined in Table 1. Controls: age, political party, race, gender, log(income), years of education, and member of religious group.
Every single coefficient in Table 2 is insignificant and each point estimate is within 2 pp of zero. Modest effect sizes can be ruled out at the 95-percent significance level. There is no evidence for aggregate-level positivity-motivated reasoning or negativity-motivated reasoning. There is no evidence that subjects infer differently on positivity-related topics compared to the neutral topic. There is no evidence that subjects have formed erroneous beliefs in the direction of their motivated reasoning.

An alternative measure of motivated reasoning, which looks at subjects update their beliefs about the original question, generates the same prediction. After seeing the message, subjects’ updated median belief is elicited. 38 percent of the time, subjects update in the positive direction (s.e. 1 percent). 38 percent of the time, subjects update in the negative direction (s.e. 1 percent). 24 percent of the time, subjects stay with their original guess (s.e. 1 percent). Clearly, there is no systematic updating in the positive or negative direction.

4.3 Heterogeneity

The results above show that there is no aggregate evidence for positivity- or negativity-motivated reasoning. This may be because nobody engages in motivated reasoning or because there is some heterogeneity with mean zero. This section discusses two forms of heterogeneity: heterogeneity across people, and heterogeneity across questions.

As shown in columns 4 and 5 of Table 2, there is no evidence that subjects have formed their current beliefs on these topics because of past motivated reasoning. This suggests that the degree of heterogeneity across people is not likely to be large. In support of this, Table 3 shows that treatment effects are not especially heterogeneous across demographic groups in systematic ways.
Table 3: Heterogeneity in Positivity-Motivated Reasoning: Horse Race Regression

<table>
<thead>
<tr>
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<th>(1)</th>
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<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos News x Male</td>
<td>0.03</td>
<td>(0.02)</td>
<td>0.02</td>
<td>(0.02)</td>
<td></td>
<td></td>
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<tr>
<td>Pos News x (Age&gt;32)</td>
<td>-0.04*</td>
<td>(0.02)</td>
<td>-0.03*</td>
<td>(0.02)</td>
<td></td>
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<tr>
<td>Pos News x White</td>
<td>-0.01</td>
<td>(0.02)</td>
<td>-0.01</td>
<td>(0.02)</td>
<td></td>
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<tr>
<td>Pos News x College</td>
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<td>(0.02)</td>
<td>-0.01</td>
<td>(0.02)</td>
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<tr>
<td>Pos News x (Inc&gt;50K)</td>
<td>-0.01</td>
<td>(0.02)</td>
<td>-0.01</td>
<td>(0.02)</td>
<td></td>
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<td>Pos News x Democrat</td>
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<td>(0.02)</td>
<td>-0.03</td>
<td>(0.02)</td>
<td></td>
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<tr>
<td>Pos News x Republican</td>
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<td>(0.03)</td>
<td>0.05*</td>
<td>(0.03)</td>
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<tr>
<td>Pos News x Religious</td>
<td>-0.00</td>
<td>(0.02)</td>
<td>-0.01</td>
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<tbody>
<tr>
<td>Pos News</td>
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<td>Question FE</td>
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<tr>
<td>Round FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Subject controls</td>
<td>Yes</td>
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</tr>
</thead>
<tbody>
<tr>
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<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
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</tr>
<tr>
<td>Mean</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
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</tr>
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</table>

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Notes:** OLS regression coefficients, errors clustered at subject level. FE included for round number and topic. Only Positive / Negative news observations, as defined in Table 1. Religious: subject affiliates with any religion. Controls: age, political party, race, gender, log(income), years of education, and religious.

The evidence is not precise enough to clearly argue in favor of or against between-topic heterogeneity. On one question (regarding global poverty rates), there is statistically significant evidence for *negativity*-motivated reasoning: the difference between Negative and Positive news assessments is 11 pp (s.e. 3 pp).\(^5\) The treatment effect on news assessments for the other questions is neither large nor significant at 95 percent.

\(^5\)There are several potential explanations for this. It may be noise, and it may also be a question on which self-image does play a role. In particular, people may engage in social comparison and be motivated to believe that many others are less well-off.
confidence levels. One direction for future work is to extend the domain of topics analyzed to determine whether the global poverty question is an outlier or in a different motivated category such as social comparisons.

5 Discussion

Results from the experiment indicate that there is no evidence for positivity- or negativity-motivated reasoning. To better understand the precision of these results, it is helpful to compare the results to those in Thaler (2019). Since the experimental design is the same, the comparison has the same units. Treatment effects for the three categories are plotted in Figure 3.

Figure 3: Comparing Motivated Reasoning About Positivity to Politics and Performance

Notes: Treatment effects for the effect of Positive versus Negative, Pro-Party versus Anti-Party, and Pro-Performance versus Anti-Performance on news veracity assessments. Pro-Party and Pro-Performance coefficients from Thaler (2019). Error bars correspond to 95 percent confidence intervals.

It is easily apparent that the effect of Positive news is significantly different than the effect of seeing Pro-Party news or Pro-Performance news.

6 The overall effect is still close to zero if we remove the global poverty question. In the between-subject test, the coefficient on Positive news is 0.019 (s.e. 0.11; p = 0.068); in the within-subject test, the coefficient is 0.009 (s.e. 0.19; p = .647). Effects of larger than 4 pp lie outside the 95-percent confidence interval.
There are two sets of explanations for the experimental results. First, motives may be systematically different from belief-based utility, leading people to distort how they process information differently in the self-image-relevant domains from the positivity domains. Second, people may not actually receive utility from holding beliefs from positivity.

As a suggestive test to separate these different hypotheses, I run two follow-up surveys among a new group of subjects — drawn from different Mechanical Turk samples — on January 8-9 and 13, 2019. There are 303 participants in Survey 1 and 167 in Survey 2. The evidence is consistent with the hypothesis that motives are systematically different from belief-based utility, and that survey participants are aware of this.

In Survey 1, participants were given a definition of motivated reasoning and asked to predict the direction of motivated reasoning about positivity, politics, and performance, and given sample topics on all three. On positivity, they were asked whether they thought that most people motivatedly reasoned in the direction of believing that the world was a better place for others, most people motivatedly reasoned in the direction of believing the world was a worse place for others, or about the same. The example topics were infant mortality, happiness, and cancer survival rates.

The results from this survey are shown in Figure 4. 65 percent of subjects expect motivated-reasoning distortions in the Pro-Party direction, versus only 16 percent who expect distortions in the Anti-Party direction. Similarly, 56 percent expect Pro-Performance distortions, and only 18 percent expect Anti-Performance distortions. Subjects, however, were similarly likely to predict distortions in the Positive (36 percent) and Negative (30 percent) directions; this difference is not statistically significant ($p = 0.231$). They were also more likely to predict no directional distortions about positivity (34 percent) than about party (18 percent) or performance (26 percent). Each answer about positivity is statistically significantly different from each answer about party and performance at the 5-percent level.

This suggests that the experimental results — that motivated reasoning occurs about politics and performance, but not directionally about positivity — are anticipated by the sample as a whole.

In Survey 2, participants were given the same categories and examples, but now asked to predict whether such beliefs would lead people to be happier. The results are shown in Figure 5. Unlike with motivated reasoning, a clear majority of 69 percent believes that positivity makes people happier, and only 10 percent believes that negativity increases happiness. Politics and performance have similar and statistically indistinguishable point estimates.

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7This number does not include 16 subjects in Survey 1 and 5 subjects in Survey 2 who failed a simple attention check question. Results do not qualitatively change with the inclusion of these subjects.
Figure 4: People Systematically Expect Motivated Reasoning About Politics and Performance, But Do Not About Positivity

Notes: The y-axis is the share of respondents who stated that they expect most people to have motivatedly reason in one direction, the other direction, or a similar amount in both directions. 0.4 percent of questions are left unanswered, and are coded as “Similar.” Error bars correspond to 95 percent confidence intervals. The differences between each of the Positivity bars and their corresponding bars in the Party and Performance columns are statistically significant at the 95 percent level.

Taken as a whole, the evidence is in support of the explanation that people do receive utility (in the form of happiness) from believing that the world is good for others, but not in support of this form of positivity influencing motives. That is, motives do not include other-regarding belief-based utility. This explanation may also help explain action-induced motivated beliefs, where people distort their beliefs as an excuse to not be generous to others (Exley 2015; Di Tella et al. 2015).

6 Conclusion

This paper has shown that people do not necessarily motivatedly reason in the direction of “good” states when their self-image is not at stake. When asked about positive or negative news about others, this experiment finds no evidence of systematic directional distortions of how people process the information. It also does not indicate any evidence that people’s current beliefs are distorted due to such positivity- or negativity-motivated reasoning.
Survey results additionally show that people think that believing in positive states of the world does not induce motivated reasoning. However, people do think that believing in these positive states leads to increased happiness. The results from this paper also suggest that utility-maximizing beliefs do not necessarily explain why people form persistently inaccurate beliefs.

One direction for future work is to better understand the relationship between the belief-based utility function and the motive function. For instance, do particular emotions affect utility and motives differently? These results suggest that happiness is insufficient for motives; however, in many self-image domains, pride and identity confirmation play larger roles than happiness. An alternative hypothesis in psychology, proposed by von Hippel and Trivers (2011), is that self-deception is a mechanism by which people can deceive others. Convincing others that the world is a good place can be less impactful than convincing others that one is smarter, more altruistic, or more correct.

Once the tether between the motive function and the utility function is removed,
future work can treat the motive function as a separate object for study. The objective is for this experimental design to then be used to elicit motives and analyze their role in other economic contexts.
References


Chen, Daniel, Martin Schonger, and Chris Wickens (2016). “oTree – An open-source platform for laboratory, online, and field experiments”. In: *Journal of Behavioral and Experimental Finance*.


Levay, Kevin, Jeremy Freese, and James Druckman (2016). “The Demographic and Political Composition of Mechanical Turk Samples”. In: *SAGE Open*.


## A Supplementary Appendix: Additional Tables

### A.1 Balance Table

<table>
<thead>
<tr>
<th></th>
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<th>Positive News</th>
<th>Neg vs. Pos</th>
<th>p-value</th>
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</thead>
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<td>0.468</td>
<td>0.011</td>
<td>0.567</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.014)</td>
<td>(0.020)</td>
<td></td>
</tr>
<tr>
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<td>0.002</td>
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<td>(0.011)</td>
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</tr>
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<td>(0.014)</td>
<td>(0.020)</td>
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<td></td>
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<td>(0.014)</td>
<td>(0.020)</td>
<td></td>
</tr>
</tbody>
</table>

| N              | 1248          | 1306          | 2554        |

**Notes:** Standard errors in parentheses. Education is in years. Religious is 1 if subject in any religious group. Positive and Negative News is defined in Table 1.
B Study Materials: Exact Question Wordings

Infant Mortality

The CDC provides statistics for mortality rates for infants. In 1997, there were 28.0 thousand infant deaths in the United States.

How many thousands of infant deaths in the United States were there in 2017 (the most recent year available)?

(If you answer X, it means you think that there were X thousand deaths.)

Correct answer: 22.3.
Source linked on results page: https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_10-508.pdf

Others’ Happiness

Many surveys ask the following question about subjective happiness:

“Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?”

In 2006, the average subjective happiness level in the United States was 7.18 out of 10.

What was the average subjective happiness level in the US in 2018?

Correct answer: 6.88.
Source linked on results page: https://ourworldindata.org/happiness-and-life-satisfaction

Cancer in Children

Acute Myeloid Leukemia (AML) is a devastating illness in which cancerous cells emerge in the bone marrow, invade the blood stream, and may spread to the rest of the body. Tragically, hundreds to thousands of children under the age of 15 are diagnosed with AML each year; it is one of the most common cancers among children.

Of children under the age of 15 who are diagnosed with AML, what percent survive for at least 5 years?

(Please guess between 0 and 100.)

Correct answer: 68.8.
Global Poverty

Around the world, many people do not have enough money for basic necessities. The World Bank defines extreme poverty as having less than the equivalent of $1.90 per day.

In 1990, the World Bank estimated that 1897 million people around the world were living in extreme poverty.

As of 2015 (the most recent year available), how many millions of people around the world live in extreme poverty?

(If you answer X, it means you think that X million people live in extreme poverty.)

Correct answer: 731.

Source linked on results page: http://povertydata.worldbank.org/poverty/home/

Armed Conflict

The Department of Peace and Conflict Research estimates that 45.8 thousand people were killed per year in battles in the fifteen years from 1989-2003.

How many thousands of people were killed per year in battles in the fifteen years from 2004-2018?

(If you answer X, it means you think that X thousand people were killed per year.)

Correct answer: 48.12


Latitude of Center of the United States

The U.S. National Geodetic Survey approximated the geographic center of the continental United States. (This excludes Alaska and Hawaii, and U.S. territories.)

How many degrees North is this geographic center?

(Please guess between 0 and 90. The continental U.S. lies in the Northern Hemisphere, the Equator is 0 degrees North, and the North Pole is 90 degrees North.)

Correct answer: 39.833.


Comprehension Check: Current Year

In 1776 our fathers brought forth, upon this continent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal.
What is the year right now?

This is not a trick question and the first sentence is irrelevant; this is a comprehension check to make sure you are paying attention. For this question, your lower and upper bounds should be equal to your guess if you know what year it currently is.

Correct answer: 2019.

Source linked on results page: \url{http://bit.ly/what-year-is-it}
C  Study Materials: Pages in Experiment

Introduction

You are invited to participate in this online study on US and world attitudes. This is a research project being conducted by Michael Thaler, a PhD student in economics at Harvard University.

Your participation in this survey is entirely voluntary. You may refuse to take part in the research or exit the survey at any time without penalty.

If you choose to be in the study, you will complete a series of questions related to issues affecting the world today. The study should take approximately 15 minutes to complete, but you may take up to 60 minutes. You will have a chance to earn a bonus of up to $10.00 in addition to your participation earnings.

Your specific answers will not be shared with anyone, and for the purpose of privacy please do not include your name or other personally identifiable information in your responses. Please make sure to mark your Amazon Profile as private if you do not want it to be accessible via your Mechanical Turk Worker ID.

If you have any questions or concerns, please contact Michael Thaler at michaelthaler@g.harvard.edu.

You may print or save a copy of this information sheet for your own records. Please do not press the back button, refresh, or leave the page at any time or else you might have a server error; if this happens, you will not be able to reenter the study or earn your payment.

If you wish to participate in the study, please indicate below that you have read the instructions and enter your Mechanical Turk Worker ID for payment.

What is your MTurk Worker ID number? This is required for payment.

☐ I have read the above information and would like to participate in the study.

Next
Demographic Information

It is important for this study that you answer these questions honestly.

Your earnings and bonus are not affected by your answers to these questions.

What is your age?

What is your gender?
- Male
- Female
- Other / Prefer not to answer

What is your race/ethnicity?
- Black or African American
- White
- Asian
- American Indian
- Hispanic or Latino
- Two or more of these
- Other / Prefer not to answer

What is the highest level of education you have completed?
- Did not graduate high school
- High school graduate or GED
- Began college, no degree
- Associate's degree
- Bachelor's degree
- Postgraduate or professional degree

What religious group do you consider yourself affiliated with?
- Mainline Protestant
- Historically black Protestant
- Evangelical Protestant
- Catholic
- Other Christian
- Jewish
- Muslim
- Other religion or faith
- Atheist
- Agnostic
- Unaffiliated
Which US state or territory do you currently live in?

What was your total household income before taxes during the past 12 months?
- Less than $20,000
- $20,000 to $29,999
- $30,000 to $39,999
- $40,000 to $49,999
- $50,000 to $69,999
- $70,000 to $99,999
- $100,000 to $149,999
- $150,000 or more

In politics today, do you consider yourself a Republican, a Democrat, or an Independent?
- Republican
- Democrat
- Independent

Where do you see yourself on the liberal/conservative spectrum?
- Extremely liberal
- Liberal
- Slightly liberal
- Moderate
- Slightly conservative
- Conservative
- Extremely conservative

Please rate how you feel about the Republican Party using a scale of 0 to 100. The higher the number, the more favorable you feel toward the Republican Party.

Please rate how you feel about the Democratic Party using a scale of 0 to 100. The higher the number, the more favorable you feel toward the Democratic Party.
Instructions for Question Pages

Throughout this study, you will see several types of pages, including 7 Question pages.

On each of the Question pages, you will be asked to guess the answer to a factual question; each question has a correct numerical answer. In addition to your guaranteed HIT payment, you will have a chance to win an additional bonus of $10.00 based on your guesses to these questions and questions on other pages. At least one question is an "attention check" for which the correct answer will be obvious.

You will also be asked to provide an upper bound and lower bound for your guess. You should choose these bounds in a way such that you think the answer has a 50% chance of falling between your bounds. The more confident you are, the smaller the difference should be between your upper and lower bound.

The details of the point system used to determine your chance of winning the prize are a bit complicated, but explained below if you are interested. **What is important to know is that the way your earnings are determined ensures that your chances of winning the bonus are maximized by carefully and honestly answering these questions.**

At the end of the study, the points you receive on all choices you make will be averaged, and this will determine the chance (out of 1000) that you win the bonus. For example, if you earn 90 points on average, you will have a 90 out of 1000 chance of winning the bonus.

Your final score, whether you won the prize, and a list of correct answers and sources will be provided at the end of the study.

You will see a Question page on the next screen.

Next

---

**Point system for your guess:**
You will receive between 0 and 100 points for each guess you give. The closer your guess is to the correct answer, the more likely it is that you’ll win the prize.

If you guess the answer correctly, you will receive 100 points (the maximum) for that question.
If your guess is more than 100 away from the answer, you will receive 0 points for that question.
If your guess is less than 100 away from the answer, you will receive points equal to 100 minus the distance from your guess to the correct answer.

It is in your best interest to guess an answer that is in the "middle" of what you believe is likely. For example, if you think the answer is equally likely to be 10, 40, and 60, you should guess 40.

**Point system for your bounds:**
If the answer is **above** your upper bound, you will receive points equal to 100 minus 3 times the distance from your guess to the correct answer.
If the answer is **below** your upper bound, you will receive points equal to 100 minus the distance from your guess to the correct answer.
If the answer is **above** your lower bound, you will receive points equal to 100 minus the distance from your guess to the correct answer.
If the answer is **below** your lower bound, you will receive points equal to 100 minus 3 times the distance from your guess to the correct answer.

You cannot earn negative points. All negative point values will be rounded up to zero.

It is in your best interest to choose a lower bound such that you think it's 3 times more likely to be above the bound than below it, and an upper bound such that it's 3 times more likely to be below the bound than above it. For example, if you think the answer is equally likely to be any number from 100 to 200, you should set a lower bound of 125 and an upper bound of 175.
Question

Question 1 of 7: Infant Mortality
The CDC provides statistics for mortality rates for infants.

In 1997, there were 28.0 thousand infant deaths in the United States.

How many thousands of infant deaths in the United States were there in 2017 (the most recent year available?)

(If you answer X, it means you think that there were X thousand deaths.)

My guess:

My lower bound:

My upper bound:

Please choose your bounds so that you think there's a 50% chance that the answer is between the bounds.

Next
Instructions for News Assessment Pages

After most Question pages, you will see a News Assessment page.

There has been a growing debate about the accuracy of news sources, with many people accusing various media of spreading “Fake News.” News sources have reported extensively on topics such as health, conflict, and poverty; some give factual information, while others may distort the truth or lie outright. This part of the study is testing whether people can recognize Fake News and True News.

On each News Assessment page, you will see the previous Question page and be given a message related to your previous guess from either a True News source or Fake News source. In addition to your guaranteed HIT payment, you will have a chance to win an additional bonus of $10.00 based on your answers to these questions and questions on other pages. The message will say either “The answer is greater than your previous guess” or “The answer is less than your previous guess.”

**The True News source will always tell you the truth, while the Fake News source will never tell the truth.**

If the answer truly is greater than your previous guess, True News will tell you “The answer is greater than your previous guess” and Fake News will tell you “The answer is less than your previous guess.”

If the answer truly is less than your previous guess, True News will tell you “The answer is less than your previous guess” and Fake News will tell you “The answer is greater than your previous guess.”

Whether you get your message from True News or Fake News is random and each source is equally likely; different messages may come from different sources. Seeing Fake News on one page does not affect the chances of seeing Fake News on any other page.

**After each question, you will assess whether you think it is more likely that the source is True News or Fake News on a scale of 0/10 to 10/10, and your assessment will determine how many points you will earn for that page.**

The details of the point system to determine your chance of winning the prize are a bit complicated, but explained below if you are interested. **What is important to know is that the way your earnings are determined ensures that your chances of winning the bonus are maximized by carefully and honestly answering these questions.**

You will see a News Assessment page on the next screen.
### Point system:

<table>
<thead>
<tr>
<th>Your estimate</th>
<th>Points earned if the source is True News</th>
<th>Points earned if the source is Fake News</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/10 chance it’s True News; 10/10 chance it’s Fake News</td>
<td>0 points</td>
<td>100 points</td>
</tr>
<tr>
<td>1/10 chance it’s True News; 9/10 chance it’s Fake News</td>
<td>19 points</td>
<td>99 points</td>
</tr>
<tr>
<td>2/10 chance it’s True News; 8/10 chance it’s Fake News</td>
<td>36 points</td>
<td>96 points</td>
</tr>
<tr>
<td>3/10 chance it’s True News; 7/10 chance it’s Fake News</td>
<td>51 points</td>
<td>91 points</td>
</tr>
<tr>
<td>4/10 chance it’s True News; 6/10 chance it’s Fake News</td>
<td>64 points</td>
<td>84 points</td>
</tr>
<tr>
<td>5/10 chance it’s True News; 5/10 chance it’s Fake News</td>
<td>75 points</td>
<td>75 points</td>
</tr>
<tr>
<td>6/10 chance it’s True News; 4/10 chance it’s Fake News</td>
<td>84 points</td>
<td>64 points</td>
</tr>
<tr>
<td>7/10 chance it’s True News; 3/10 chance it’s Fake News</td>
<td>91 points</td>
<td>51 points</td>
</tr>
<tr>
<td>8/10 chance it’s True News; 2/10 chance it’s Fake News</td>
<td>98 points</td>
<td>36 points</td>
</tr>
<tr>
<td>9/10 chance it’s True News; 1/10 chance it’s Fake News</td>
<td>99 points</td>
<td>19 points</td>
</tr>
<tr>
<td>10/10 chance it’s True News; 0/10 chance it’s Fake News</td>
<td>100 points</td>
<td>0 points</td>
</tr>
</tbody>
</table>

For instance, if you estimate a 7/10 chance of True News, then for that round you will earn 91 points if the source is True News and 51 points if the source is Fake News.

At the end of the study, the points you receive on all choices you make will be averaged, and this will determine the chance (out of 1000) that you win the bonus. For example, if you earn 90 points on average, you will have a 90 out of 1000 chance of winning the bonus.
News Assessment

Original question 1 of 7: Infant Mortality
The CDC provides statistics for mortality rates for infants.

In 1997, there were 28.0 thousand infant deaths in the United States.

How many thousands of infant deaths in the United States were there in 2017 (the most recent year available? (If you answer X, it means you think that there were X thousand deaths.)

Message:
The answer is less than your previous guess of 25.0.

Do you think this information is from True News or Fake News?
- 0/10 chance it's True News; 10/10 chance it's Fake News
- 1/10 chance it's True News; 9/10 chance it's Fake News
- 2/10 chance it's True News; 8/10 chance it's Fake News
- 3/10 chance it's True News; 7/10 chance it's Fake News
- 4/10 chance it's True News; 6/10 chance it's Fake News
- 5/10 chance it's True News; 5/10 chance it's Fake News
- 6/10 chance it's True News; 4/10 chance it's Fake News
- 7/10 chance it's True News; 3/10 chance it's Fake News
- 8/10 chance it's True News; 2/10 chance it's Fake News
- 9/10 chance it's True News; 1/10 chance it's Fake News
- 10/10 chance it's True News; 0/10 chance it's Fake News

After seeing this message and assessing its truthfulness, what is your guess of the answer to the original question?