Attitudes as Assets[*]

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Abstract

Attitudinal survey data has been a foundation for researchers, policymakers, and democracies. Yet preference falsification, the act of misrepresenting a preference under public pressure, is common. We micro-found attitudinal data collection into two components: the utility of expressing the underlying preference weighed against the price of expressing that attitude. We randomly expose fundamentalist or progressive speech to rural teachers in Pakistan and show that fundamentalist speech does not affect teachers' preferences although it makes fundamentalist attitudes less costly. The progressive speech makes teachers' preferences more liberal. We validate our results with petitions to the parliament.

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1 Introduction

The public frequently conveys, especially to researchers or pollsters, attitudes that differ from what they truly want, often because they believe the conveyed attitude is more acceptable socially. Attitudes are thus highly context-dependent and affected by a variety of psychological and social factors (Kuran (1997); Bertrand and Mullainathan (2001)). In this paper, we interpret attitudes as resulting from the maximization of a utility function subject to a budget constraint. Attitudes are like assets. Utility over attitudes captures a relatively enduring subjective ordering of attitudes, in sum, worldviews, or social norms. The prices of attitudes reflect the many different social or self-imposed constraints that can impact attitudes.

To assess the validity of our framework, we propose a novel methodology to recover preferences over attitudes. Subjects' attitudes are first collected through a standard survey of questions on numerical scales. Subjects are then given various opportunities to answer the same survey under different price structures. A price structure is characterized by a budget over tokens and associates a price to each question in the survey. Attitudes, as assets, are "bought" at experimentally set prices. Specifically, on a scale that measures the intensity of an attitude, the higher the attitude on that scale, the costlier it is to "buy" that attitude. The opportunity cost of choosing one attitude is the gain foregone by choosing other attitudes that could also be "bought" under a given price structure. Hence, subjects' preferences over attitudes can be recovered using established techniques in consumer demand analysis (Afriat (1967)).

We leverage subjects' preferences to elicit the prices of attitudes. This allows us to disentangle the influence of preferences from that of prices on subjects' attitudes. We then demonstrate that changes in attitudes induced by an experimental treatment can be additively decomposed into two components. One related to changes in the prices of attitudes (e.g., the treatment decreases the prices of fundamentalist attitudes), and one related to changes in preferences (e.g., the treatment gives subjects a more tolerant worldview). This decomposition is based on the estimation of a counterfactual, which characterizes the attitudes that a subject would have expressed if her preferences were affected by treatment but the prices of her attitudes remain unchanged.

We apply our framework on attitudes about Ramadan fasting, observed by a quarter of the world population every year (Pew (2018)). In a randomized evaluation in Pakistan, civil servants are exposed to fundamentalist and liberal religious speeches using the medium

of prominent thought leaders (*Imams*) followed by writing exercises and structured discussion. Through this field experiment, we investigate the effect of fundamentalist and liberal religious speeches on both subjects' preferences over religious attitudes and the prices of these attitudes.

Our first treatment group involves participants being exposed to a thought leader in Pakistan providing a liberal interpretation of the Quranic verses discussing Ramadan fasting. The thought leader encourages Muslims to postpone fasting and argues that fasting can be postponed in Ramadan both for personal and external reasons, for instance, due to the personality or "temperament" of a person or due to external circumstances such as weather and other inconveniences such as travel. Our second treatment group involves the participants watching another prominent thought leader in Pakistan providing a more fundamentalist interpretation of Quranic verses prescribing fasting. He explicitly encourages all Muslims "not to miss a single fast in the month of Ramadan come what may". In the control group, subjects watched a video describing facts and statistics about the Pakistani economy.

To maximize the retention, comprehension, and application of the preaching, we utilized recent advances in pedagogy through the use of social-emotional learning (Schwardmann, Tripodi and van der Weele (2022)). After each speech including the control, the civil servants complete two writing exercises: a 100-word essay summarizing the message and another essay on how they may apply the lessons to their lives. They then engage in a structured discussion on the main messages provided in their treatment group.

In both the treatment and the control groups, we deployed a version of our experimental methodology. Subjects were asked to allocate various budgets in tokens between two statements: A fundamentalist statement: "All adult Muslims should fast during Ramadan" and a liberal statement: "Heat and weather are legitimate reasons to postpone Ramadan fasting". Subjects' attitudes with respect to these two statements were measured on a 10-point scale. A higher value on a statement implies that the subject agrees more with the statement. Following our methodology, we offer subjects 16 opportunities to allocate tokens amongst the two statements under varying budget constraints.

About ten months after the first experiment, we run a follow-up experiment with the same pool of subjects to infer both longer-term impacts and investigate if our results hold in a higher stakes setting. In the follow-up, subjects were given the opportunity to sign a Petition that opposed a fundamentalist religious policy that bans eating, smoking, and drinking in public places during the month of Ramadan (the Ehtram-e-Ramazan Ordi-

nance). The subjects put their decisions anonymously in sealed envelopes, which were shredded with some probability known in advance (Andreoni and Bernheim (2009); Chen and Schonger (2020)).[1]

Our first set of results relates to the impact of the religious message on attitudes. Exposure to the fundamentalist speech increases fundamentalist attitudes by about 2 points on a 10-point scale, a 20% increase relative to the sample mean, while exposure to the liberal speech has the opposite effect: it increases liberal attitudes by a full point on a 10-point Likert scale. This is equivalent to a 33% increase in liberal attitudes over the mean dependent variable. We then use our decomposition to interpret these results and find that the liberal and fundamentalist treatment effects are explained by distinct mechanisms. Exposure to the fundamentalist speech does not change subjects' preferences but decreases the price of fundamentalist attitudes, as opposed to liberal attitudes. By contrast, exposure to the liberal speech makes subjects' preferences more liberal, while it increases the price of liberal attitudes, as opposed to fundamentalist attitudes. Finally, given our counterfactual simulation, we also estimate what attitudes subjects would have expressed if their preferences changed in the treatment groups but not the prices of attitudes. We find that if exposure to the liberal speech was not affecting subjects' prices of attitudes, subjects would answer that they agree 1.7 points more with the liberal statement, which is 42% higher than what they actually report.

Our second set of results leverages the follow-up experiment. Provided that the price of liberal attitudes is sufficiently low, i..e., the shredding probability is sufficiently high, subjects feel less constrained when choosing to sign the petition. Hence, we should not expect the fundamentalist speech to affect subjects' propensity to sign the petition since that treatment does not affect subjects' preferences. In contrast, we should expect the liberal treatment to affect subjects' propensity to sign since that treatment makes subjects' preferences more liberal. This is precisely what we find in the follow-up. Exposure to the liberal treatment increases subjects' likelihood of signing by about 40% provided that the shredding probability is at least equal to 33%. On the opposite, provided that the shredding probability is above 33%, exposure to the fundamentalist speech has no effect on subjects' propensity to sign the petition.

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[1]Naturally occurring settings that emulate the shredding design include Bergstrom, Garratt and Sheehan-Connor (2009)'s decision to sign-up as a bone marrow donor, which varies with the likelihood of needing to actually donate bone marrow and Choi, Van Riper and Thoyre (2012)'s decision not to abort a fetus with Down Syndrome, which also varies with the likelihood the fetus actually has Down Syndrome.

We demonstrate the robustness of these results through a series of sensitivity analyses. First, we show that the randomly assigned groups are balanced across individual characteristics. Second, we find that restricting the sample to the most rational subjects does not appear to change any of our conclusions. Finally, we use the data to examine how treatment effects would vary if more teachers within a school were treated. We find spillover effects to be limited in magnitude and unlikely to overturn any of our main conclusions.

This paper contributes to several strands of the literature. Principally, it relates to the large literature on social norms, their origins, and persistence (e.g., Akerlof and Kranton (2000); Bisin and Verdier (2001); Shayo (2009); Bénabou and Tirole (2011); Bernheim et al. (2021); Atkin, Colson-Sihra and Shayo (2021); Acemoglu and Robinson (2021)). We contribute to this literature by showing that attitudes can be seen as resulting from a standard utility maximization problem under a budget constraint. Our approach is also close to several studies in sociology suggesting that social norms are not monolithic structures, but rather made of patterns of interconnected beliefs, attitudes, or rituals (Geertz (1973); Swidler (2003); DiMaggio (1997)).

Second, we contribute to the literature on changes in attitudes and social norms (e.g., Bursztyn, González and Yanagizawa-Drott (2020); Bursztyn, González and Yanagizawa-Drott (2018); Giuliano and Nunn (2020)). We show that changes in attitudes can be additively decomposed into two fundamental elements. One related to changes in preferences, and one related to changes in the prices of attitudes. Hence, factors influencing the price of attitudes such as the experimenter-demand effect or self-censorship can be measured and filtered in the analysis of social behavior.

Third, we contribute to the literature on revealed preferences (Afriat (1967); Varian (1990, 1982); Banerjee and Murphy (2005); Blundell, Browning and Crawford (2008); Crawford (2010); Choi et al. (2014); Crawford and Pendakur (2013); Crawford and De Rock (2014); Halevy, Persitz and Zrill (2018); Deb et al. (2021)). On the empirical side, studies are focused on consumption decisions (Banerjee and Murphy (2005); Crawford and Pendakur (2013); Choi et al. (2014); Blundell et al. (2015): Halevy, Persitz and Zrill (2018)). However, many decisions are shaped by attitudes. While the influence of attitudes on choices is well established (Guiso, Sapienza and Zingales (2003), Clingingsmith, Khwaja and Kremer (2009), Bursztyn et al. (2019); Giuliano and Nunn (2020)), transforming these ethereal aspects of human's subjectivity into an objective, well-measured reality has long

been a challenge in the social sciences. Our methodology adds price structures to a standard survey of Likert scale questions.[2] That way, preferences over attitudes can be "revealed".[3]

Finally, through our application exercise in a field experiment, we contribute to the growing literature on the economics of religion (e.g., Iannaccone (1992); Iyer (2016), Becker, Rubin and Woessmann (2020)). Existing studies have documented the effect of religious leaders on political and judicial outcomes (e.g., Chaney (2013); Mehmood and Seror (2023)). We build on the existing literature by studying how fundamentalist or liberal speeches impact religious attitudes. We give evidence that fundamentalist and liberal religious speeches affect religious attitudes through different channels. The fundamentalist speech decreases the cost of expressing fundamentalist attitudes but does not change religious preferences. This result suggests that religious fundamentalism might be sustained by preference falsification (Kuran (1997)), thereby explaining why fundamentalism often impedes the formation of true public opinion and creates a barrier to social change. We find that the liberal speech makes subjects' religious preferences more liberal. This result is also consistent with preference falsification, as it suggests that a minor event - a liberal speech - can trigger sudden and significant changes in religious preferences (Kuran (1997)).

Section 2 presents the experimental methodology and the decomposition. Section 3 describes the data and the experimental design. Section 4 presents the empirical specification. Section 5 presents the main experimental results, and Section 6 discusses the follow-up. Section 7 presents the robustness analysis, and Section 8 concludes.

2 Theory

2.1 Priced Survey Methodology

Let $\mathcal{I} = \{1, \ldots I\}$ denote a set of subjects, and $\mathcal{S} = \{1, \ldots S\}$ a survey made of S questions asking subjects to report their attitudes on numerical scales. In the methodology, subjects first answer the survey $\mathcal{S}$ without a price structure. A survey without a price structure is

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[2]Seror (2022) discusses the theoretical foundations of this methodology.

[3]For a broad discussion of surveys and their relation to revealed preferences, see Stantcheva (2022). The priced survey methodology is close to the Quadratic Voting for Survey Research (QVSR) recently developed to study political opinions (e.g., Quarfoot et al. (2016); Bassetti et al. (2016)). In the QVSR methodology, subjects are given a fixed budget to express their political opinions and face a quadratic cost when they wish to express more extreme opinions. Our approach differs from the QVSR in one fundamental way. We do not posit a quadratic cost function, but rather follow the neoclassical approach by assuming linear budget constraints. Repeating the experiment under various budgets, we are able to understand subjects' revealed preferences over attitudes.

referred to as a standard survey in the rest of the paper. Subject i's attitudes, as measured in the standard survey, is denoted $\mathbf{q_{i,0}} \in \prod_{s \in \mathcal{S}} \{0, \ldots N(s)\}$, where $N(s) > 1$ is the highest numerical level that can be reported on the scale associated to question s. Subjects are then offered repeated opportunities to fill the same survey under different price structures that are experimentally set. Let $\mathcal{K} = \{1, \ldots K\}$ be the index set of observations. The price structure of observation k denoted $(R_k, \mathbf{p_k})$, is characterized by a budget in tokens $R_k \in \mathbb{N}_+$ and a price vector $\mathbf{p_k} = \{p_{k,s}\}_{s \in \mathcal{S}} \in \mathbb{R}_{++}^S$. In observation k, subjects have R_k tokens to allocate to the survey. Increasing the answer to question s by one unit costs $p_{k,s}$ tokens. We denote $q_{i,k,s} \in \{1, \ldots N(s)\}$ subject i's answer to statement s in observation k and $\mathbf{q_{i,k}} = \{q_{i,k,s}\}_{s \in S}$ his vector of answers. Finally, $D_i = \{\mathbf{q_{i,k}}, \mathbf{p_{i,k}}\}_{k \in \mathcal{K}}$ gives the set of data observed for subject i. By assumption, in any observation k, subjects are constrained to saturate their budget constraint.[4]

This experimental design mimics a revealed preference experiment.[5] Instead of spending resources by choosing the quantities of the goods they wish to consume, subjects express their attitudes by answering survey questions. In this model, there are two fundamental influences on attitudes. The first is related to subjects' preferences. The second is related to prices. Preferences reflect an enduring organization of attitudes, which subjects leverage in various situations. In contrast, the prices of attitudes are context-dependent. For example, someone might find it more costly to give liberal attitudes in front of a fairly fundamentalist audience.

Using the data D_i, subject i's preferences over attitudes can be recovered, applying the generalized version of Afriat's (1967) famous theorem (Halevy, Persitz and Zrill (2018)). Below, we develop a parametric procedure to additively decompose any experimental treatment effect as explained by either change in subjects' preferences over attitudes (e.g., the treatment cultivates a more tolerant worldview) or by changes in prices (e.g., the treatment increases the price of expressing xenophobic attitudes).

The basic idea of the decomposition is to use subjects' answers to the standard survey to elicit the prices of attitudes. Subject i's attitudes $\mathbf{q_{i,0}}$ can be interpreted as the outcome of a utility-maximizing behavior:

$$\mathbf{q_{i,0}} = \underset{\mathbf{q} \in \prod_{s \in \mathcal{S}} \{0, \ldots N(s)\}}{\arg\max} u_i(\mathbf{q}) \text{ subject to } \mathbf{p_i}.\mathbf{q} \leq 1 \tag{1}$$

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[4]This assumption is made so that subjects are constrained to make tradeoffs when they answer the survey in any given observation.

[5]See, for example, Choi et al. (2014), Andreoni and Miller (2002) or Crawford and Pendakur (2013).

where $u_i(.)$ is i's utility function over attitudes, and $p_{i,0,s}$ is the imputed price of i's attitude with respect to statement s. The imputed budget is normalized to 1 without loss of generality in (1).

To the extent that $\mathbf{q_{i,0}}$ is not on a corner (i.e., $0 < q_{i,0,s} < N(s)$ for any $s \in \mathcal{S}$), and given that subject i's utility function $u_i(.)$ is continuous, monotone, and concave, there is a unique vector of imputed prices that i faces when answering the survey. In the standard survey, if subject i's answers to a pair (s, z) of questions are not on a corner, then the ratio $p_{i,0,s}/p_{i,0,z}$ is simply equal to the marginal rate of substitution $\frac{\partial u_i(\mathbf{q_{i,o}})}{\partial q_{i,0,s}} / \frac{\partial u_i(\mathbf{q_{i,o}})}{\partial q_{i,0,z}}$.[6]

Let T_i be a dummy variable that is equal to 1 if subject i is randomly assigned to the treatment group and 0 otherwise. We assume for simplicity that there is an even number of subjects divided into two groups of $I/2$ subjects. We define

$$
\mathbf{q_{i,0}} = \begin{cases} \mathbf{q_{i,0}^0} \text{ if } T_i = 0 \\ \mathbf{q_{i,0}^1} \text{ if } T_i = 1 \end{cases} \quad \text{and} \quad \mathbf{p_{i,0}} = \begin{cases} \mathbf{p_{i,0}^0} \text{ if } T_i = 0 \\ \mathbf{p_{i,0}^1} \text{ if } T_i = 1 \end{cases} \tag{2}
$$

We also define $\mathbf{\hat{q}_i}$ as subject i's predicted answer when her preferences are affected by the treatment but the imputed prices are not. The ideal decomposition of a treatment effect can then be represented in Figure 1. The vector $\mathbf{\hat{q}_i} - \mathbf{q_{i,0}^0}$ measures the treatment effect on subject i due to changes in i's preferences, keeping the prices of attitudes fixed. The vector $\mathbf{q_{i,0}^1} - \mathbf{\hat{q}_i}$ measures the treatment effect on subject i due to changes in i's attitudes' prices, keeping her preferences fixed.

The vector $\mathbf{\hat{q}_i}$ cannot be observed empirically, as we cannot simultaneously observe subject i's attitudes' prices when she is not treated and her preferences when she is. However, we can still decompose a treatment effect by relying on the estimation of subjects' representative utility function and price parameters in the treatment and control groups. To infer the representative utility function of the treated, we take the utility parameters for which the average answer in group T is generated by the average price vector in that group. This method makes use of individual-level imputed prices and survey answers.[7]

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[6]This is further elaborated in Seror (2022). In the standard survey, if subject i's answer to question s is zero (resp. $N(s)$), then the possible values of $p_{i,0,s}$ are bounded from below (resp. from above), $p_{i,0,s} \geq \frac{1}{\lambda} \frac{\partial u_i(\mathbf{q_{i,o}})}{\partial q_{i,0,s}}$ (resp. $p_{i,0,s} \leq \frac{1}{\lambda} \frac{\partial u_i(\mathbf{q_{i,o}})}{\partial q_{i,0,s}}$) with $\lambda > 0$ the Lagrange coefficient associated with the optimization problem (1).

[7]An alternative method requires using aggregate data on survey answers $\mathbf{\overline{q}_0^T} = \sum_{i,T_i=T} \frac{2}{I} \mathbf{q}_{i,0}$ to estimate a representative utility function and deduce the associated imputed price vector. We find the first method preferable to the second, as the first exploits individual-level data for imputed prices - derived from individual answers - rather than deducing imputed prices from average answers to the survey.

The predicted answer in the treatment group, $\hat{\mathbf{q}}$ under the average price constraint of the control group can be characterized as follows:

$$\hat{\mathbf{q}} = \underset{\mathbf{q} \in \prod_{s \in \mathcal{S}}[0, N(s)]}{\arg\max} \ \overline{u}^1(\mathbf{q}) \text{ under the constraint } \mathbf{q}.\overline{\mathbf{p}}_0^0 \leq 1, \tag{3}$$

with $\overline{u}^1$ a representative utility function for the treatment group, and $\overline{\mathbf{p}}_0^0 = \sum_{i,T_i=0} \frac{2}{I} \mathbf{p}_{i,0}$, the average imputed price vector in the control group.[8] We can then decompose $\mathbf{q}_{\mathbf{i},\mathbf{0}}$ into two components, $\mathbf{x_i}(\hat{\mathbf{q}})$ and $\mathbf{w_i}(\hat{\mathbf{q}})$:

$$\mathbf{x_i}(\hat{\mathbf{q}}) = \begin{cases} \mathbf{q}_{\mathbf{i},\mathbf{0}}^{\mathbf{0}} \text{ if } T_i = 0 \\ \hat{\mathbf{q}} \text{ if } T_i = 1 \end{cases} \text{ and } \mathbf{w_i}(\hat{\mathbf{q}}) = \begin{cases} \hat{\mathbf{q}} \text{ if } T_i = 0 \\ \mathbf{q}_{\mathbf{i},\mathbf{0}}^{\mathbf{1}} \text{ if } T_i = 1. \end{cases} \tag{4}$$

In this decomposition, $\mathbf{x_i}(\hat{\mathbf{q}})$ measures how the treatment affects preferences and $\mathbf{w_i}(\hat{\mathbf{q}})$ measures how the treatment affects prices. We can express $\mathbf{q}_{\mathbf{i},\mathbf{0}}$ as:

$$\mathbf{q}_{\mathbf{i},\mathbf{0}} = \boldsymbol{\alpha} + \boldsymbol{\beta} T_i + \boldsymbol{\eta_i} \tag{5}$$

in the case of constant treatment effects, where $\boldsymbol{\eta_i} = \{\eta_{i,s}\}_{s \in \mathcal{S}}$ is a vector of random variables that we assume identical and independently distributed.

Fact 1 *The treatment effect $\boldsymbol{\beta}$ can be additively decomposed into two vectors, $\boldsymbol{\beta} = \boldsymbol{\beta_1}(\hat{\mathbf{q}}) + \boldsymbol{\beta_2}(\hat{\mathbf{q}})$ with $\boldsymbol{\beta_1}(\hat{\mathbf{q}})$ the average treatment effect associated with the estimation of*

$$\boldsymbol{w_i}(\hat{\mathbf{q}}) = \boldsymbol{\alpha_1} + \boldsymbol{\beta_1} T_i + \boldsymbol{\epsilon_i}, \tag{6}$$

and $\boldsymbol{\beta_2}(\hat{\mathbf{q}})$ the average treatment effect associated with the estimation of

$$\boldsymbol{x_i}(\hat{\mathbf{q}}) = \boldsymbol{\alpha_2} + \boldsymbol{\beta_2} T_i + \boldsymbol{\mu_i}, \tag{7}$$

with $\boldsymbol{\mu_i}$ and $\boldsymbol{\epsilon_i}$ two vectors of i.i.d random variables.

Proof. Given the random assignment of the subjects across the treatment and control groups,

$$\boldsymbol{\beta} = E(\mathbf{q}_{\mathbf{i},\mathbf{0}} \mid T_i = 1) - E(\mathbf{q}_{\mathbf{i},\mathbf{0}} \mid T_i = 0), \tag{8}$$

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[8]Deriving a unique imputed price vector for each individual requires restricting the sample to interior answers. See Seror (2022).

which can be rewritten

$$\boldsymbol{\beta} = E(\mathbf{q_{i,0}} \mid T_i = 1) - \hat{\mathbf{q}} + \hat{\mathbf{q}} - E(\mathbf{q_{i,0}} \mid T_i = 0). \tag{9}$$

By definition of $\mathbf{x_i}$ and $\mathbf{w_i}$,

$$
\begin{aligned}
E(\mathbf{q_{i,0}} \mid T_i = 1) &= E(\mathbf{w_i} \mid T_i = 1) \\
E(\mathbf{q_{i,0}} \mid T_i = 0) &= E(\mathbf{x_i} \mid T_i = 0) \\
E(\mathbf{x_i} \mid T_i = 1) &= E(\mathbf{w_i} \mid T_i = 0) = \hat{\mathbf{q}}
\end{aligned}
\tag{10}
$$

Hence,

$$
\begin{aligned}
\boldsymbol{\beta} &= E(\mathbf{w_i} \mid T_i = 1) - E(\mathbf{w_i} \mid T_i = 0) + E(\mathbf{x_i} \mid T_i = 1) - E(\mathbf{x_i} \mid T_i = 0) \\
\boldsymbol{\beta} &= \boldsymbol{\beta_1}(\hat{\mathbf{q}}) + \boldsymbol{\beta_2}(\hat{\mathbf{q}}).
\end{aligned}
\tag{11}
$$

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The vector $\boldsymbol{\beta_1}(\hat{\mathbf{q}})$ corresponds to the average treatment effect on subjects' preferences keeping their budget constraint equal to its average in the control group. The vector $\boldsymbol{\beta_2}(\hat{\mathbf{q}})$ corresponds to the average treatment effect on subjects' budget constraint, keeping their preferences equal to their "average" in the treatment group.

To summarize, we demonstrated that with the priced survey methodology, subjects' preferences over attitudes can be recovered. We then demonstrated that using this methodology, a treatment effect on attitudes can be additively decomposed into two components. One related to changes in preferences, and one related to changes in prices.

3 Data, Treatment and Experimental Design

Sample. — Our sample consists of the largest network of teachers in Pakistan: the Progressive Education Network (PEN). The PEN network aims to improve the quality of education and teaching in Pakistani government schools via a public-private partnership. The approach of the PEN network is similar to charter schools in the United States (Angrist and Pischke (2014)), where the focus is on training and managing the schools using public funds by the private actors i.e. under a public-private partnership. The network employs 607 public school teachers and 52 schools across the State of Punjab in Pakistan.

Experimental Setup.— We randomly assign 607 public school teachers into three treatment arms with 202 assigned the fundamentalist speech, 202 the liberal speech and 203 the placebo message. All treatments including the placebo were presented to the civil servants during a live zoom session. The video messages last about three minutes long each including the placebo. To reinforce the message of the video, motivated by the literature on social-emotional learning, each group completes two writing exercises and a structured individual discussion within the treatment arm. Specifically, the civil servants complete two writing exercises: a 100-word essay summarizing the video message and another 100-word essay on how they may apply the lessons of the video to their lives. They also engage in a 30-minute structured discussion on the main messages of the video live on Zoom. These "self-persuasion" exercises are inspired by the literature on social-emotional learning with the application of concepts being an effective tool to internalize and reinforce the message. Our experiment was conducted in Pakistan, as part of a broader controlled experiment aiming at understanding the influence of the online diffusion of fundamentalist and liberal religious speeches on the civil servants' religious attitudes. In the experiment, we measure civil servants' religious attitudes through Likert scale questions, and petitions the civil servants are willing to send to the parliament to repeal a fundamentalist law about behavior in Ramadan fasting.

Figure B.1 provides the flow chart on the timing of the two experiments. After being subject to one of the three treatments, each subject was surveyed on two statements on her religious attitudes. The two statements are the followings:

1. *Fundamentalist statement:* "All adult Muslims should fast during Ramadan"

2. *Liberal statement:* "Heat and weather are legitimate reasons to postpone Ramadan fasting"

For both statements, subjects had to answer on a 0-10 scale by moving cursors. Subjects' first report their attitudes with respect to these two statement on standard $0-10$ Likert scales. Subjects were informed that a higher answer for a given statement meant that they agreed more with that statement. We deployed a version of the experiment outlined in Section 2 where subjects divide budgets in tokens between the two previous statements. The subjects had to move cursors that appear on their screen below the statements on a scale from 0 to 10. Moving the cursor associated with a given statement means that the subject agrees more with that statement. The cursors are initially all on position

0. Moving the cursors is costly. The total number of tokens allocated per statement was shown on the left of the scales so that subjects did not have to make mental calculations. Subjects were offered 16 opportunities to allocate different budgets between the two statements, as summarized in Figure 2. Figure B.2 of Appendix B presents the typical screen of a subject in one session, while Figure B.3 presents the screen during the standard survey.

Fundamentalist Treatment.— Our first treatment group involves the participants watching a prominent thought leader in Pakistan providing a fundamentalist interpretation of Quranic verses prescribing fasting. He explicitly encourages all Muslims "not to miss a single fast in the month of Ramadan come what may". He argues explicitly that one needs to tolerate the heat and the weather and fast under all conditions. We use the term 'fundamentalism' in the classical sense, which scholars have defined as a movement within Islam that aims to return to the founding scriptures of Islam with a literal and traditional interpretation of the Quranic verses (Phœnix (1930)). The link to the complete video of the fundamentalist speech can be found in Figure B.4.

Liberal Treatment.— Our second treatment group involves the participants watching another prominent thought leader in Pakistan providing a liberal interpretation of the Quranic verses discussing Ramadan fasting. He explicitly encourages all Muslims to postpone fasting, for instance, due to a personality of a person who finds it hard to fast or due to external circumstances such as weather and other inconveniences such as travel. He concludes by arguing that even the whole month of Ramadan fasting can be postponed to another month when the length of fasting is shorter and the weather milder. The link to the complete video of the liberal speech can be found in Figure B.4. Finally, both thought leaders are listed as the "500 Most Influential Muslims" in the world by the Royal Aal al-Bayt Institute for Islamic Thought in Jordan which issues this list annually.

Placebo.— Our placebo group watches a video of equal length to the liberal or fundamentalist speech but unrelated to Ramadan fasting. This included facts and figures about the Pakistani economy. This included discussing the concept of GDP and inflation, followed by some macroeconomic trends such as GDP and inflation trends in Pakistan for the past two decades. The link to the placebo video can be found in the note to Figure B.4.

Finally, in both the treatment and the control groups, the civil servants complete two writing assignments in class immediately following the viewing of the speech. This involves writing short takeaways from the randomly assigned speech and the second essay, also a 100-word summary on how they may be able to apply the lessons of the video in their

lives. They get 15 minutes to complete each task. Participants also engage in a 30-minute structured discussion on the main messages of the video live on Zoom.

4   Empirical Specification

The impact of the fundamentalist and liberal speeches can be evaluated in a simple regression framework. For each individual-level outcome, the estimation equation is:

$$Y_i = \alpha + \beta \text{Conservative}_i + \gamma \text{Liberal}_i + X_i'\mu + \epsilon_i$$

where Y_i corresponds to subject i's responses to the two statements in the Likert scale survey. Conservative$_i$ is a dummy equal to one if i is randomly assigned to the fundamentalist speech. Liberal$_i$ is a dummy equal to one if i is randomly assigned to the liberal speech. X_i is a vector of individual-level controls, which includes age, marital status, and prior education. We cluster standard errors at the individual level since that is our level of randomization. β and γ are our main coefficients of interest and estimate the causal effect of the treatments.

Balance and Attrition. Table 1 reports the results of the balance check on those randomly assigned to the fundamentalist and liberal speeches. Differences across treatment and control groups are small in magnitude, and statistically no different from zero, suggesting that the randomization was effective at creating balance. Importantly, we also measured subjects' fasting propensity before treatment and found no statistical differences between treated and untreated subjects.

5   Main Results

Table 2 reports the results on the impact of the treatments on civil servants' opinions. Exposure to the fundamentalist speech with structured discussion increases fundamentalist attitudes by about 1.7 points on the 0-10 Likert scale associated with the fundamentalist statement, and decreases liberal attitudes by about 1.2 points, as measured by the liberal statement. Exposure to the liberal speech has the opposite effect. It decreases fundamentalist attitudes by about 2 points and increases liberal attitudes by about 1.3 points.

While the speeches affect subjects' attitudes, it is not clear whether the results are driven by changes in subjects' preferences or by changes in the prices of religious attitudes.

For example, it could be that exposure to the fundamentalist speech makes fundamentalist attitudes less costly but does not affect subjects' preferences. Similarly, subjects' attitudes become more liberal after watching the liberal speech because these subjects believe that we (the experimenters) expect them to report liberal attitudes. In this case, the treatment would decrease the relative price of liberal attitudes without affecting subjects' preferences.

Decomposition. Using the individual-level data set from the priced survey methodology $D_i = \{\mathbf{q_{i,k}}, \mathbf{p_{i,k}}\}_{k \in \mathcal{K}}$, we estimated individual-level CES utility specification through non-linear least square techniques:[9]

$$u_i(\mathbf{q_i}) = (a_i q_{i,1i}^{\rho} + (1 - a_i) q_{i,2i}^{\rho})^{1/\rho_i}, \tag{12}$$

for each agent $i \in \mathcal{I}$. Parameter $a_i \in [0, 1]$ gives the relative weight of a fundamentalist attitude for subject i. Parameter ρ_i captures the convexity of subject i's preferences through the elasticity of substitution $\sigma_i = 1/(\rho_i - 1)$. Following our theoretical framework, in the first step, we estimate individual-level utility function and imputed prices to deduce the representative utility function $\overline{u}^T$ in treatment group T.[10] In a second step, from equation (3), we deduce the counterfactual $\hat{\mathbf{q}}$, which gives a subject's predicted answers when her preferences are affected by the treatment but the prices of attitudes are not. Finally, from (4), we define variables $\mathbf{x_i}(\hat{\mathbf{q}})$ and $\mathbf{w_i}(\hat{\mathbf{q}})$, and implement the decomposition, as outlined in Fact 1.

Table 3 gives the decomposition of the two treatment effects. Since the imputed prices can only be recovered for survey answers that were interior, the corner answers had to be dropped. This represented 100 observations out of the 604 initial observations (the sample remains balanced, as shown in Table B.1). We find that exposure to the fundamentalist speech has no significant effect on subjects' preferences. Subjects' attitudes are more fundamentalist in this treatment because subjects fundamentalist attitudes are less costly. By contrast, exposure to the liberal speech makes subjects' preferences more liberal, while liberal attitudes become more costly, as opposed to fundamentalist attitudes.

Comparing column (5) to column (4) of Table 3, the subjects in that treatment would answer that they agree 37% more with the liberal statement, provided that the prices of attitudes remained unaffected by the treatment. As these subjects agree only 20% more

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[9]For alternatives to the NLLS, see, Halevy, Persitz and Zrill (2018).

[10]The parameters of the representative utility in the two treatment groups and in the control group are reported in Table B.2 of Appendix B.

with the Likert scale liberal statement, following the treatment, self-censorship or social pressure might reduce subjects' propensity to report liberal attitudes.

6   Follow-up Experiment with Petitions to Legislature

The decomposition gives two key insights regarding the treatment effects. First, exposure to the liberal speech makes subjects' preferences more liberal. Second, exposure to the fundamentalist speech decreases the cost of fundamentalist attitudes but does not affect subjects' preferences.

To test the validity of the decomposition, we conducted a follow-up experiment on the same pool of subjects about ten months after the experiment. Civil servants were given the opportunity to sign a Petition to the Pakistani parliament to abolish laws preventing eating or drinking during the Ramadan ritual fast (abolish The Ehtram-e-Ramazan Ordinance). Each subject could then anonymously put her decision in a sealed envelope, which was shredded with some probability known in advance. In this design, the price of expressing a liberal attitude by signing the petition is a function of the shredding probability. The higher the shredding probability, the lower the price of a liberal attitude.

The motivation for this follow-up is two folds. First, since the liberal speech affected subjects' preferences, subjects should have a higher propensity to sign the petition, provided that the price of doing so is sufficiently low. Second, since the fundamentalist speech does not change subjects' preferences, it should not impact subjects' behavior, provided that the shredding probability is sufficiently high.

Table 4 presents the results. The subjects that watched the liberal speech are about 35% more likely to sign the petition than the subjects in the control group, provided that the shredding probability is at least equal to 33%. At the same time, the subjects that watched the fundamentalist speech are not more likely to sign the petition than the subject in the control group, provided that the shredding probability is at least equal to 33%.

These results are consistent with the decomposition of Table 1. If exposure to the liberal speech affects subjects' preferences, it should affect their propensity to sign the petition when the shredding probability is high enough. In contrast, exposure to the fundamentalist speech does not change subjects' preferences although it makes fundamentalist attitudes more costly. Hence, provided that this price effect is compensated by a sufficient decrease in the price of the liberal attitude (i.e., the shredding probability is sufficiently high), then

we should not expect the fundamentalist speech to affect subjects' propensity to sign the petition.

7   Robustness Analysis

Rationality. - In their recent study on revealed preferences, Halevy, Persitz and Zrill (2018) demonstrate in their Theorem 1 that conditional on their rationality level, subjects behave as if they are maximizing some locally nonsatiated utility function. Since our methodology mimics revealed preference experiments on consumption choices, the result of Halevy, Persitz and Zrill (2018) applies to our study. Hence, if the two treatments impact subjects' rationality, treatment effects on subjects' preferences and prices on the one hand, and on subjects' rationality on the other would be confounded. To alleviate this concern, we proceeded in two steps. First, we documented the effect of the treatments on the subjects' rationality. Second, we restricted the sample to the most rational subjects and assessed whether it would change our conclusions. The main criterion for evaluating rationality in the decision-making of consumers is the Generalized Axiom of Revealed Preference (GARP). It requires consistent preferences over all alternatives and choices that correspond to the most preferred alternative in the feasible set. Given our experimental methodology, we can compute a variety of goodness-of-fit indices that quantify violations of GARP. First, we compute Afriat's (1972) Critical Cost Efficiency Index (CCEI). It measures the minimum budget adjustment needed for the data set to satisfy GARP. The index increases from 0 to 1 as a subject becomes more rational. In the context of this experiment, the CCEI can be interpreted as an upper bound of the fraction of income that a subject is "wasting" by expressing inconsistent attitudes. Second, we compute the Houtman and Maks (1985) index. It measures irrationality as the minimal number of observations that need to be dropped so that a subject's remaining choices satisfy GARP. The index equals 1 if the subject is rational, and equals 0 if all observations except 1 need to be dropped for the subject to be rational. Third, we compute a "trembling hand" rationality index equal to 1 if the subject is fully rational or made only one inconsistent choice, and 0 otherwise. Finally, we compute a rationality index that is equal to 1 if the subject is rational and 0 otherwise.

The results are reported in Table B.3. Overall the subjects, the CCEI scores averaged 0.60, which is relatively lower than what is usually found in consumption choices. We find a positive impact of both treatments on the various measures of rationality. In the

liberal treatment, the subjects' CCEI reaches 0.89. Similarly, the Houtman and Maks (1985) index indicates that 94% of the full sample would generate a rational choice in the liberal treatment, and 73% of the subjects make only one inconsistent choice. The results are weaker for the fundamentalist speech although it also significantly increases subjects' rationality.

In order to verify whether the decomposition results are driven by the treatment effects on rationality, we run the decomposition analysis in a sample of almost rational subjects. These are defined as subjects for which the minimum number of observations that need to be dropped in order to satisfy GARP is at most 2. The results are reported in Table B.5. Although the number of observations drops to 153, we find that the decomposition remains fairly similar to the decomposition obtained for the full sample. This suggests that the treatments have separate impacts on subjects' rationality on the one hand, and on preferences and prices on the other.

Spillover effects. - If there are spillovers across treated and control teachers within a school, with some control teachers also getting treated, we would then underestimate the true effect of the treatments. To test for the existence of spillovers, we use the data to examine how the treatment effects would vary if more teachers within a school were treated. Figure B.6 shows substantial variation in the fraction of treated teachers across schools. The impacts of this variation are reported in Table B.4. We find that there are no spillovers associated with the treatments.[11]

Experimental Demand. - Our results are also unlikely to be explained by experimental demand. First, exposure to the liberal and fundamentalist speeches prompts responses in different dimensions. Second, the impact on preferences is observed up to a year after the treatment, which is difficult to reconcile with experimenter demand arguments. Third, petitions to the parliament are high-stakes, having real social, political, and reputational costs. Finally, we use the Marlowe-Crowne social desirability scale, a survey module developed by social psychologists to rigorously measure a person's propensity to give socially-desirable answers (Crowne and Marlowe (1960)). As reported in Tables B.6, B.7, and B.8, when we discard individuals who score high on their social desirability scale, the results remain essentially identical for both the decomposition and the follow-up. These features of our experiment indicate that our results are unlikely to be explained by experimenter demand.

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[11]To the extent that spillovers exist, they could be decomposed them using this framework. Experimenters could then use our framework to evaluate whether spillovers are working through the preferences channel or through the price channel.

8 Conclusion

Do people mean what they say? Much like the neoclassical approach, in this paper, we interpret attitudes as resulting from a utility-maximizing behavior. Attitudes are like assets, as they are durable and private goods that can be leveraged in various decisions. Utility over attitudes captures a relatively enduring subjective ordering of attitudes, in sum, worldviews, or social norms. Attitudes come at prices, e.g., entail social costs that mediate the expression of attitude via psychological and physiological forces.

We introduce a novel methodology to assess the validity of our approach and formalize it in a model. We show that changes in attitudes can be additively decomposed into two components: one related to changes in the prices of attitudes, and one related to changes in preferences.

To test our model, we embedded our experimental methodology in a broader field experiment in Pakistan where we conducted a randomized controlled trial with civil servants. Through our treatments, we explored the impact of religious speeches by prominent imams, fundamentalist, and liberal, on attitudes. Applying the decomposition, we find that exposure to the fundamentalist speech does not affect subjects' preferences although it makes fundamentalist attitudes less costly. By contrast, exposure to the liberal speech makes subjects' preferences more liberal. We assess the validity of our results through a follow-up experiment with high-stakes decisions where subjects could sign a liberal petition that was sent to parliament with varying probabilities. The outcome of the follow-up confirms our previous results.

One important question is left unanswered in this paper. Where do the prices of attitudes come from? We use a partial equilibrium approach by considering prices as exogenous and infer prices using subjects' choices. By doing so, we abstract from the exact mechanisms that influence the prices of attitudes, be it the experimenter-demand effect, self-censorship, or conformist pressure. While this is a strength of our approach, it also leaves aside key questions related to the emergence of social norms. Future research can extend our approach to study the prices of attitudes in a general equilibrium framework.

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Tables and Figures

Table 1: Balance test

	(1) Years of Education	(2) Married	(3) Specialization in Languages	(4) Specialization in Sciences	(5) Specialization in Social Sciences	(6) Specialization in Teaching	(7) Teaching Experience	(8) Teaching Hours (avg.)	(9) Class Size	(10) Gender	(11) Age
fundamentalist treatment	-0.110	-0.008	0.058	-0.018	-0.004	-0.040	0.098	0.636	0.065	0.013	-0.318
	(0.191)	(0.062)	(0.044)	(0.009)	(0.030)	(0.054)	(0.402)	(0.346)	(2.583)	(0.055)	(0.764)
Liberal treatment	-0.027	-0.032	0.072	0.012	-0.028	-0.033	-0.391	0.135	0.925	0.074	0.599
	(0.193)	(0.060)	(0.043)	(0.011)	(0.029)	(0.056)	(0.409)	(0.339)	(2.674)	(0.057)	(0.778)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	604	604	604	604	604	604	604	604	604	604	604

Standard errors are clustered at the individual level. The dependent variable in column (1) is schooling years, in (2) — binary variable equal to 1 if married and 0 otherwise, in (3) — binary variable equal to 1 if specialization is in Languages and 0 otherwise, in (4) — binary variable equal to 1 if specialization is in Sciences and 0 otherwise, in (5) — binary variable equal to 1 if specialization is in Social Sciences and 0 otherwise, in (6) — binary variable equal to 1 if specialization in teaching and 0 otherwise, in (7) — years of teaching, in (8) — average hours of teaching, in (9) - the number of students per class, in (10) — binary variable equal to 1 if teacher is a female, in (11) the age of the teacher. The full sample includes 201 subjects in the control group, 202 in the fundamentalist treatment group and 200 in the liberal treatment group. As demonstrated in Section 2 subjects whose Likert scale answers correspond to corner solutions of the maximization problem had to be excluded in order to run the decomposition. This represented 100 observations out of the 604 initial observations. The sample remains balanced, as shown in Table B.1. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Impact of Treatments on Fundamentalist and Liberal Attitudes

	(1) Fundamentalist Statement	(2) Liberal Statement
Fundamentalist treatment	1.699***	-0.983***
	(0.194)	(0.296)
Liberal treatment	-1.901***	1.297***
	(0.262)	(0.312)
Individual Controls	Yes	Yes
Observations	504	504

Robust standard errors in parentheses. The dependent variables for fundamentalist and liberal treatments are Fundamentalist and liberal statements in Likert scale respectively: "All adult Muslims should fast during Ramadan" and "Heat and weather are legitimate reasons to postpone Ramadan fasting". Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Decomposition of Treatment Effects into Preferences and Imputed Prices

	(1) Fundamentalist Overall Effect	(2) Fundamentalist Preferences	(3) Fundamentalist Imputed Prices	(4) Liberal Overall Effect	(5) Liberal Preferences	(6) Liberal Imputed Prices
Fundamentalist treatment	1.679***	0.101	1.577***			
	(0.192)	(0.172)	(0.082)			
Liberal treatment				1.291***	1.702***	-0.411*
				(0.312)	(0.239)	(0.203)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	323	323	323	339	339	339

Robust standard errors in parentheses. The dependent variables for fundamentalist and liberal treatments are fundamentalist and liberal statements in Likert scale respectively. The overall effect is decomposed into the effect due to changes in preferences and due to changes in imputed prices. Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. In columns (1), (2), and (3), we decompose the fundamentalist treatment, so the sample considered includes the control group and the fundamentalist treatment group. In columns (4), (5), and (6), we decompose the liberal treatment, so the sample considered includes the control group and the liberal treatment group. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Petition opposing Ramadan Law with a probability of shredding

	(1) Shredded 1%	(2) Shredded 5%	(3) Shredded 33%	(4) Shredded 66%	(5) Shredded 100%
Liberal treatment	0.0708	0.101	0.388**	0.355*	0.373*
	(0.0497)	(0.147)	(0.148)	(0.166)	(0.158)
Fundamentalist treatment	-0.371*	-0.368**	-0.0912	0.163	0.169
	(0.161)	(0.128)	(0.170)	(0.159)	(0.149)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes
Observations	121	121	121	122	122

Standard errors are clustered at the individual level. The dependent variables correspond to the results of the experiment when the probability of the petition being shredded equal to 1%, 5%, 33%, 66% and 100%. Liberal Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the liberal Imam. Fundamentalist Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the relatively more fundamentalist Imam. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1: Decomposition

q_2

$\mathbf{q_{i,1}}$

$\hat{\mathbf{q}}_{\mathbf{i}}(\mathbf{p_{i,0}})$

$\mathbf{q_{i,0}}$

q_1
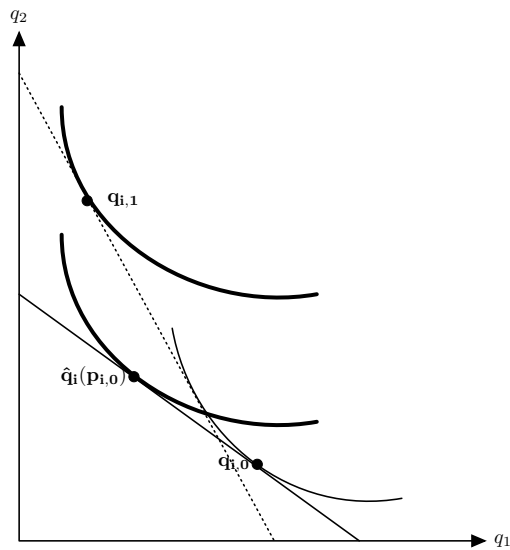
Vector $\hat{\mathbf{q}}_{\mathbf{i}}(\mathbf{p_{i,0}}) - \boldsymbol{q_{i,0}}$ measures the treatment effect on subject i due to changes in i's preferences, keeping her budget constraint fixed. Vector $\boldsymbol{q_{i,1}} - \hat{\mathbf{q}}_{\mathbf{i}}(\mathbf{p_{i,0}})$ measures the treatment effect on subject i due to changes in i's budget constraint, keeping her preferences fixed. The thick indifference curve corresponds to subjects' preferences in the treatment group. The thin indifference curve corresponds to subjects' preferences in the control group.

Figure 2: Budget Constraints
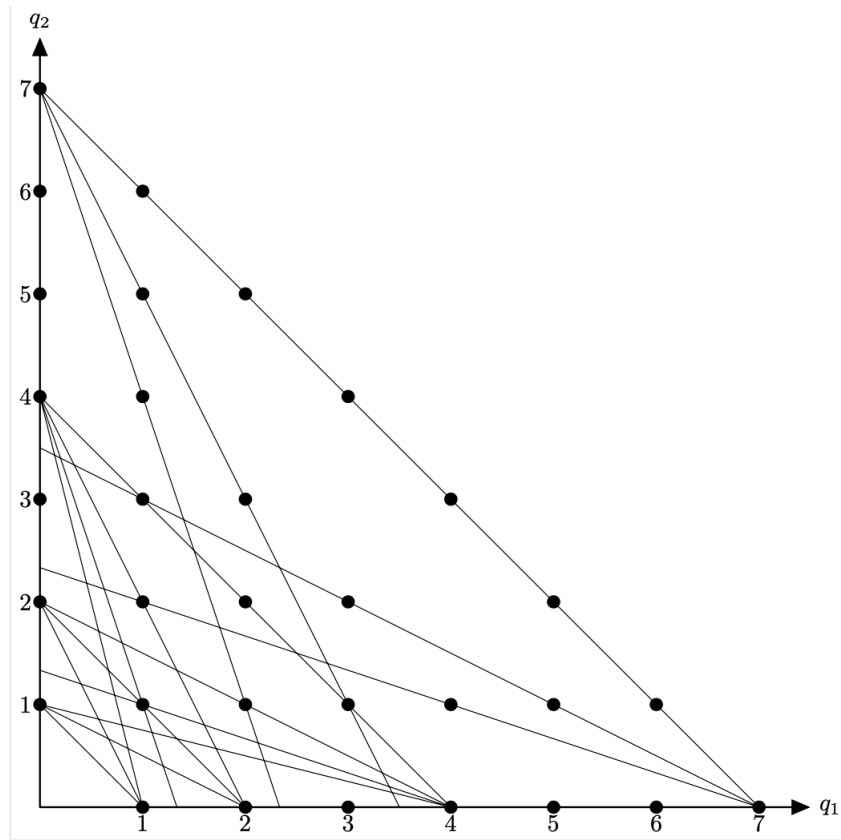
The horizontal axis represents a subject's answer to statement 1, while the vertical axis represents a subjects' answer to statement 2. The line represents the various budget constraints. Each point in the figure on a budget constraint represents a possible answer. For example, there are eight possible answers when the budget constraint is $q_1 + q_2 = 7$, as a subject can choose any answer from the set $\{(7,0), (6,1), (5,2), (4,3), (3,4), (2,5), (1,6), (0,7)\}$.

Online Appendices to "Attitudes as Assets"

A Consent

I agreed to participate in the research study. I understand the purpose and nature of this study and I am participating voluntarily. I understand that I can withdraw from the study at any time, without any penalty or consequences.

☐ Yes

☐ No

I grant permission for the data generated from this survey to be used in the researcher's publications on this topic.

☐ Yes

☐ No

I grant permission to researchers to use my anonymized information for research purposes and this includes my personal data with PEN.

☐ Yes

☐ No

For parents: I grant permission to researchers to use my son or daughter's anonymized information for research purposes and this includes the personal data with PEN.

☐ Yes

☐ No

B   Additional Tables and Figures

Figure B.1: Flow Chart on Timing of the Two Experiments

Conservative Treatment	Liberal Treatment	Placebo Message

Part 1
April 2021

Maulana Tariq Jamil's Message

Writing exercises and Structured discussion

Maulana Javed Ghamdi Message

Writing exercises and Structured discussion

Dr Shaheen Naseer Message

Writing exercises and Structured discussion

Part 2
August 2021

Subjects are surveyed on two statements on a Likert scale

- *Conservative statement:* "All adult Muslims should fast during Ramadan"
- *Liberal statement:* "Heat and weather are legitimate reasons to postpone Ramadan fasting"

Subjects were presented with a menu of choices with different budgets and prices for answering the above statements. The subjects divide budgets in tokens between the two above statements.

Part 3
December 2021

Sign petition to abolish law against eating and drinking during Ramadan ("Ehtram-e-Ramazan Ordinance")

The decision to sign a petition to repeal Ehtram-e-Ramazan Ordinance is solicited under different probabilities of the petition being shredded (and not sent to the Parliament). Please Appendix C for further details.

The flow chart above reports the timing and set-up of the two experiments. Collection of baseline characteristics and treatment roll out takes place in April 2021, while the surveys and "game" with tokens is conducted in August 2021. The second experiment on petitions that are sent to the Parliament with varying probabilities is conducted in December 2021.

Figure B.2: Experimental Methodology

How much do you agree with each of these statements?

0 means you are indifferent and 10 means you completely agree.

Statement 1: All adult Muslims should fast during Ramadan.

———○——————————————————— [0]

Statement 2: Heat and weather are legitimate reasons to postpone Ramadan fasting.

———○——————————————————— [0]

[Next]

Figure B.3: Likert Scale Survey

How much do you agree with each of these statements?

0 means you are indifferent and 10 means you completely agree.

Statement 1: All adult Muslims should fast during Ramadan.

———○——————————————————— [0]

Statement 2: Heat and weather are legitimate reasons to postpone Ramadan fasting.

———○——————————————————— [0]

[Next]

Figure B.4: Religious Speeches with English Subtitles

Tolerate the heat, tolerate the hunger, and tolerate the thirst!

(a) Fundamentalist Speech

So God has given permission that the fasts can be postponed and can instead be completed on other days when days are shorter and milder.

(b) Liberal Speech

Panel A provides a screen shot from the fundamentalist speech presented to the civil servants assigned the fundamentalist treatment. Full fundamentalist speech by Moulana Tariq Jamil can be accessed HERE. Panel B provides a similar video for liberal speech. Full liberal speech by Moulana Javed Ghamdi can be accessed HERE. The placebo group receives a similar length video description inflation in Pakistan. Full placebo message by Dr Shaheen Naseer can be accessed HERE.

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Figure B.5: Structured discussion with the Civil Servant
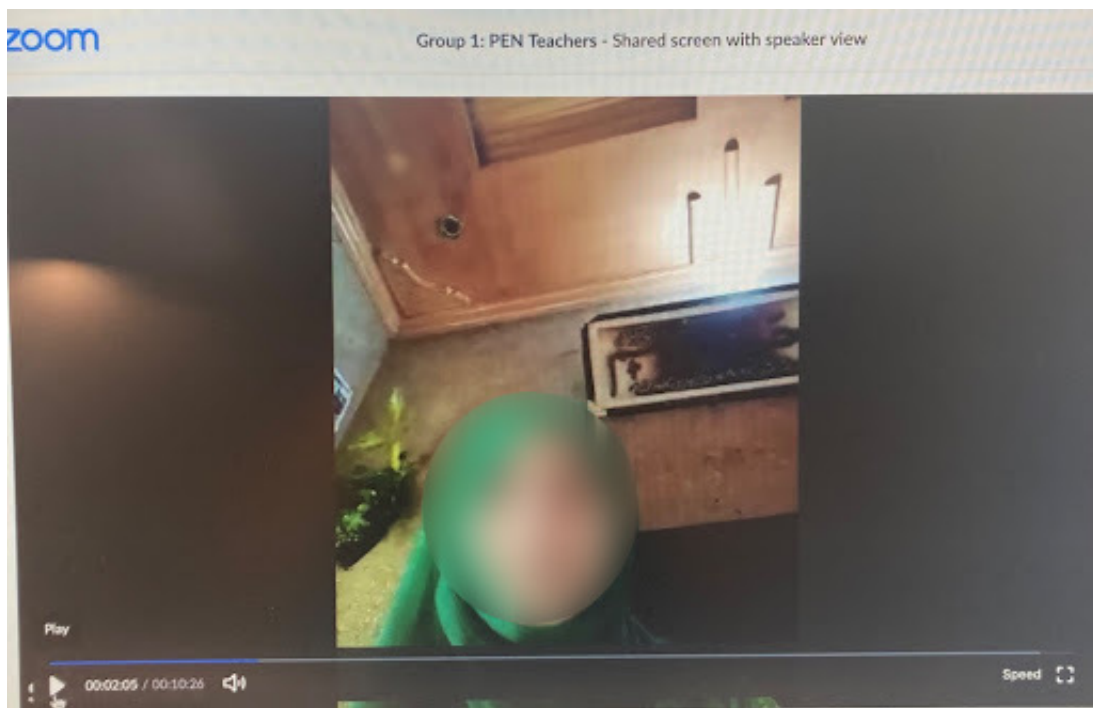
The figure above was taken during the structured discussion where the following questions were asked to each civil servant: Q1. What do you think were the main messages of the video? Q2. How do you think you may apply lessons from today's video to your life? Q3. What additional comments and remarks do you have about the video message you just listened to?

Figure B.6: Distributions of Fraction of Civil Servants Treated
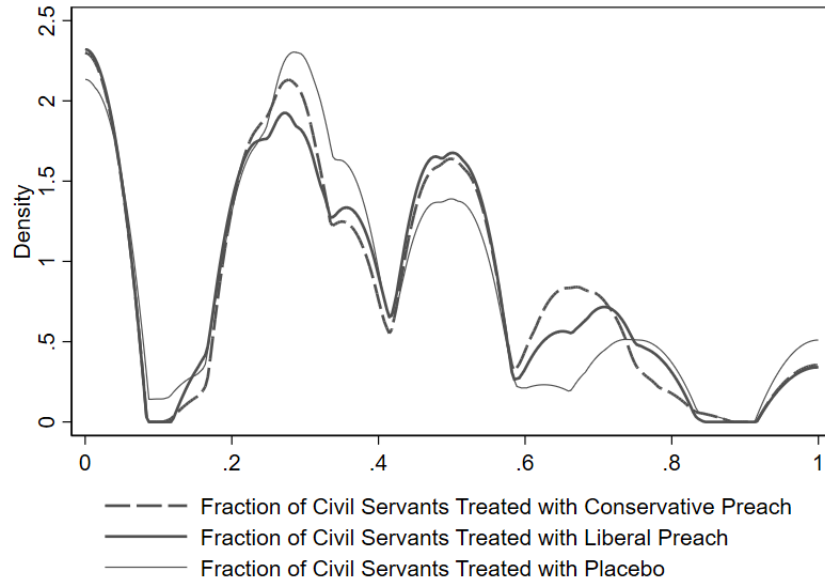
The figure plots the fraction of treated teachers within a school by the liberal, fundamentalist and placebo speech group.

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Table B.1: Balance test

	(1) Years of Education	(2) Married	(3) Specialization in Languages	(4) Specialization in Sciences	(5) Specialization in Social Sciences	(6) Specialization in Teaching	(7) Teaching Experience	(8) Teaching Hours (avg.)	(9) Class Size	(10) Gender	(11) Age
Fundamentalist treatment	-0.104	-0.022	0.041	-0.024	-0.012	-0.044	-0.317	0.512	0.536	0.068	-0.178
	(0.227)	(0.075)	(0.051)	(0.013)	(0.036)	(0.064)	(0.462)	(0.353)	(3.004)	(0.067)	(0.891)
Liberal treatment	0.002	-0.046	0.093	0.012	-0.038	-0.034	-0.702	0.358	0.275	0.087	0.949
	(0.225)	(0.069)	(0.051)	(0.014)	(0.035)	(0.064)	(0.454)	(0.390)	(2.925)	(0.065)	(0.903)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	504	504	504	504	504	504	504	504	504	504	504

Standard errors are clustered at the individual level. The dependent variable in column (1) is schooling years, in (2) — binary variable equal to 1 if married and 0 otherwise, in (3) — binary variable equal to 1 if specialization is in Languages and 0 otherwise, in (4) — binary variable equal to 1 if specialization is in Sciences and 0 otherwise, in (5) — binary variable equal to 1 if specialization is in Social Sciences and 0 otherwise, in (6) — binary variable equal to 1 if specialization in teaching and 0 otherwhise, in (7) — years of teaching, in (8) — average hours of teaching, in (9) - the number of students per class, in (10) — binary variable equal to 1 if teacheer is a female, in (11) - the age of the teacher. The full sample includes 201 subjects in the control group, 203 in the fundamentalist treatment group and 200 in the liberal treatment group. Consistent with Implication 1 of Section 2, since the imputed prices can only be recovered for survey answers that were interior, the corner answers had to be dropped, i.e., answers that include either 0 or 10 for at least one statement. This represented 100 observations out of the 604 initial observations. This explains why the sample size considered in this table is 504. *p¡.05; **p¡.01; ***p¡.001

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Table B.2: Estimated Utility Parameters

	N	mean	sd	min	max
			Placebo Group		
Elasticity of substitution - σ	201	0.606	0.654	0	5.783
Weight of Fundamentalist Statement - a	201	0.620	0.286	0	1
			Liberal Treatment		
Elasticity of substitution - σ	200	0.650	1.1661	0	21.74
Weight of Fundamentalist Statement - a	200	0.162	0.190	0	1
			Fundamentalist Treatment		
Elasticity of substitution - σ	203	0.613	0.423	0	2.364
Weight of Fundamentalist Statement - a	203	0.716	0.201	0	1

The estimation is based on Non-Linear Least Square (NLLS) methodology.

Table B.3: Treatment Effects on Rationality

	(1) AEI	(2) H&M Index	(3) TH Rationality	(4) Full Rationality
Fundamentalist treatment	0.0973***	0.0775***	0.188***	0.0606**
	(0.0305)	(0.0114)	(0.0538)	(0.0298)
Liberal treatment	0.292***	0.0979***	0.401***	0.259***
	(0.0319)	(0.0132)	(0.0548)	(0.0392)
Individual Controls	Yes	Yes	Yes	Yes
School Fixed Effects	Yes	Yes	Yes	Yes
Mean dep. var.	0.596	0.838	0.329	0.109
Observations	604	604	604	604

 Standard errors are clustered at the individual level. The dependent variable in column (1) is the critical cost efficiency index (CCEI). It is the minimum adjustment to the budget such that a data set obeys GARP. The dependent variable in column (2) is the index based on the Houtman and Maks index — the maximal share of observations consistent with GARP. The dependent variable in column (3) is a dummy variable equal to 1 when the subject is fully rational or only 1 observation causes GARP violation. The dependent variable in column (4) is a dummy variable equal to 1 when the subject is fully rational. Liberal Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from Ghamdi. Fundamentalist Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from Tariq Jamil. Controls include individual level characteristics: years of education and marital status.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.4: Spillover Effects

	(1) Fundamentalist Statement	(2) Liberal Statement
Fundamentalist Treatment	1.804***	
	(0.305)	
Fraction Treated with Fundamentalist	-0.821	
	(0.867)	
Fraction Treated with Fundamentalist x Fundamentalist Treatment	0.264	
	(0.904)	
Liberal Treatment		2.018***
		(0.577)
Fraction Treated with Liberal		-0.188
		(0.790)
Fraction Treated with Liberal x Liberal Treatment		0.585
		(1.172)
Individual Controls	Yes	Yes
Observations	323	346

Robust standard errors in parentheses. The dependent variables for fundamentalist and liberal treatments are fundamentalist and liberal statements in Likert scale respectively: "All adult Muslims should fast during Ramadan" and "Heat and weather are legitimate reasons to postpone Ramadan fasting". Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded. The variable Fraction Treated corresponds to the share of subjects treated within a school. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.5: Decomposition of Treatment Effects into Preferences and Imputed Prices (Rational Subsample)

	(1) Fundamentalist Overall effect	(2) Fundamentalist Preference	(3) Fundamentalist Imputed Prices	(4) Liberal Overall effect	(5) Liberal Preference	(6) Liberal Imputed Prices
Fundamentalist treatment	1.305***	-0.130	1.434***			
	(0.316)	(0.295)	(0.114)			
Liberal treatment				0.981**	1.417***	-0.436*
				(0.483)	(0.417)	(0.242)
Mean dep. var.	8.438	7.463	8.396	5.052	5.365	5.451
Observations	153	153	153	174	174	174

Robust standard errors in parentheses. The dependent variables for fundamentalist and liberal treatments are fundamentalist and liberal statements in Likert scale respectively. The overall effect is decomposed into the effect due to changes in preferences and due to changes in imputed prices. The subsample only includes subjects who are rational or for whom the minimum number of observations that needs to be dropped for consistency according to GARP is either 1 or 2. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.6: Impact of Treatments on Fundamentalist and Liberal Attitudes with Marlowe-Crowne Scale

	(1) Fundamentalist Statement	(2) Liberal Statement
Fundamentalist treatment	1.700***	-0.992**
	(0.201)	(0.307)
Liberal treatment	-1.887***	1.251***
	(0.268)	(0.323)
Individual Controls	Yes	Yes
Observations	471	471

Robust standard errors in parentheses. The dependent variables for fundamentalist and liberal treatments are fundamentalist and liberal statements in Likert scale respectively: "All adult Muslims should fast during Ramadan" and "Heat and weather are legitimate reasons to postpone Ramadan fasting". Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.7: Decomposition of Treatment Effects into Preferences and Imputed Prices with Marlowe-Crowne Scale

	(1) Fundamentalist Overall Effect	(2) Fundamentalist Preferences	(3) Fundamentalist Imputed Prices	(4) Liberal Overall Effect	(5) Liberal Preferences	(6) Liberal Imputed Prices
Fundamentalist treatment	1.672***	0.107	1.565***			
	(0.200)	(0.180)	(0.085)			
Liberal treatment				1.250***	1.649***	-0.399
				(0.324)	(0.250)	(0.208)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	296	296	296	319	319	319

Robust standard errors in parentheses. The dependent variables for fundamentalist and liberal treatments are fundamentalist and liberal statements in Likert scale respectively. The overall effect is decomposed into the effect due to change in preferences and due to changes in imputed prices. Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. In columns (1), (2), and (3), we decompose the fundamentalist treatment, so the sample considered includes the control group and the fundamentalist treatment group. In columns (4), (5), and (6), we decompose the liberal treatment, so the sample considered includes the control group and the liberal treatment group. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.8: Petition opposing Ramadan Law with a probability of shredding with Marlowe-Crowne Scale

	(1) Shredded 1%	(2) Shredded 5%	(3) Shredded 33%	(4) Shredded 66%	(5) Shredded 100%
Liberal treatment	-0.006	0.026	0.473**	0.288	0.389*
	(0.171)	(0.161)	(0.173)	(0.179)	(0.164)
Fundamentalist treatment	-0.433*	-0.438**	0.038	0.165	0.171
	(0.173)	(0.147)	(0.203)	(0.171)	(0.150)
Individual Controls	Yes	Yes	Yes	Yes	Yes
School Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	112	112	109	113	118

Standard errors are clustered at the individual level. The dependent variables correspond to the results of the experiment when the probability of the petition being shredded equal to 1%, 5%, 33%, 66% and 100%. Liberal Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the liberal Imam. Fundamentalist Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the relatively more fundamentalist Imam. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

C Survey Instrument and Experimental Details

C.1 Ehtram-e-Ramazan Ordinance (Law Imprisoning for Public Eating in the month of Ramadan)

The "Ehtram-e-Ramazan Ordinance" was enacted in 1981 and it is as follows: "Prohibition of eating in public places. —

1. No person who, according to the tenets of Islam, is under an obligation to fast shall eat, drink or smoke in a public place during fasting hours in the month of Ramazan.

2. Whoever contravenes the provisions of sub-section (1) shall be punishable with simple imprisonment for a term which may extend to three months, or with fine or with both."

Would you sign a petition with your name that we **WILL** send to the Parliament of Pakistan to repeal this ordinance baring public eating in the month of Ramadan in Pakistan?

☐ Yes

☐ No

If, Yes, Please sign attached petition.

C.2 Petition Template Presented to all civil servants

Please fill this in a separate room individually. Please also note that we will actually send this petition to the National Assembly of Pakistan, so feel free to leave one or both petitions blank if you wish not to send one or both of these petitions.

C.3 Ramadan Petition (without shredding message)

I, ———— (enter full name), daughter/son of ———, am signing this petition to request repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to make dowry a criminal offense pertaining imprisionment for up to three years.

Yours Truly,

—————-

CNIC:

Your Full Name:

C.4   With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"

I, ————— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisionment for public eating in the month of Ramadan.

Yours Truly,

This petition has **1% probability of being shredded after you sign it** and hence 99% probability it will be sent to the parliament for consideration

C.5   With shredding petitions

Tell Parliament: Abolish the "Ehtram-e-Ramazan Ordinance (Law Imprisoning for Public Eating in the month of Ramadan)

I, ——— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

———- This petition has **5% probability of being shredded after you sign it** and hence 95% probability it will be sent to the parliament for consideration.

C.6   With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"
I, ——— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

This petition has **33% probability of being shredded after you sign it** and hence 67% probability it will be sent to the parliament for consideration

C.7   With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"
I, ——— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating

in the month of Ramadan.

Yours Truly,

This petition has **66% probability of being shredded after you sign it** and hence 34% probability it will be sent to the parliament for consideration.

C.8   With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"

I, ——— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

This petition has **100% probability of being shredded after you sign it** and hence 0% probability it will be sent to the parliament for consideration.

C.9   Marlowe-Crowne (too-good-to-be-true-statements)

Do you agree with this statement about yourself?

(a) I am never jealous of another person's good fortune Yes/No

(b) I am always a good listener Yes/No

(c) I am never angry, or I have never been angry. Yes/No