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Making it about Morals: Pope Francis Shifts the Climate Change Debate

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In June 2015, Pope Francis released his papal encyclical, *Laudato si'* : *On Care of our Common Home,* urging global action toward climate change mitigation. The official Catholic document was widely praised for its unique rhetorical approach[1] that emphasized climate change mitigation as a moral obligation shared among all people (Maxwell & Miller, 2015). As the spiritual leader of over 1 billion Catholics worldwide, Pope Francis was well-positioned not only to appeal to his followers' moral sensibilities, but to instigate an even broader impact among non-Catholics.

Here we present two studies that examine the viability of its rhetorical strategy as a proximal metric of the encyclical's success. In the first study, we used Moral Foundations Theory to analyze the text of *Laudato si'* and categorize some of its moral arguments according to how those arguments might have appealed to different ideological groups. Then, we follow-up on this analysis to examine the extent to which two popular, but ideologically distinct news sources used framing consistent with each of the moral foundations. In the second study, we used nationally-representative survey data to examine to what extent these different ideological groups accepted the moral arguments offered in *Laudato si'.*

Moral Foundations Theory: A Framework for Moral Rhetoric

Moral Foundations Theory (Graham et al., 2012) proposes that morality is rooted in multiple foundations—or evolved values—to which individuals' specific sensitivities vary culturally. Currently, there are six moral foundations categorized as pairs of values and their opposites (Haidt, 2012; Haidt & Kesebir, 2010):

- Care vs. harm: concern for the suffering of others, do no harm;

- Fairness vs. cheating: concerns about unfair treatment and justice;

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[1]Although it did not abandon well-worn climate change activism refrains (e.g., "scientists agree that anthropogenic climate change is occurring").

- Liberty vs. oppression: concerns about freedom and autonomy;

- Loyalty vs. betrayal: concern regarding forming groups and acting for the group's greater good;

- Sanctity vs. degradation: concern for purity and sacredness, and avoidance of disgust; and

- Authority vs. subversion: concern regarding social order and obedience.

People construct their personal notions of morality in varying ways according to these foundations. For example, liberals in the United States are concerned first and foremost with the *care* and *fairness* foundations, whereas conservatives in the United States are concerned about all six foundations (Haidt & Kesebir, 2010). As a result, liberals and conservatives often have difficulty understanding each other because their fundamental definitions of morality differ (Graham, Haidt, & Nosek, 2009; Haidt, 2012; Haidt & Graham, 2007).

Proponents of Moral Foundations Theory suggest that one promising strategy for bridging moral divides is to frame issues according to the moral foundations that resonate with particular stakeholder groups (Feinberg & Willer, 2015). For example, conservatives report greater support for same-sex marriage when it is framed as an issue of loyalty rather than fairness, and liberals report greater support for military spending when it is framed in terms of fairness rather than loyalty or authority (Feinberg & Willer, 2015). Furthermore, these effects are mediated by moral fit: support for issues increases in step with their perceptions that issue frames resonate with their personal values (Feinberg & Willer, 2015; Wolsko, Ariceaga, & Seiden, 2016).

This moral reframing effect is especially promising with regard to concern for the environment. Environmental concern is often framed as a moral issue in ways that seldom resonate with conservatives—mainly as harm to future generations and as an unjust distribution of burden (Markowitz & Shariff, 2012). To appeal to conservatives' moral sensibilities requires appealing to foundations other than care and fairness (e.g., Haidt & Graham, 2007). Indeed, a growing body of

literature suggests that appealing to different moral foundations could increase environmental

concerns and action intentions among conservatives. For example, one study found that

conservatives exposed to a sanctity frame (e.g., images of pollution and garbage) reported greater

pro-environmental attitudes, more support for pro-environmental legislation, and greater belief in

global warming than conservatives exposed to care frame (e.g., images emphasizing the harm and

destruction humans are causing to the land, Feinberg & Willer, 2013). Mediation analyses suggested

that these effects were driven by disgust; the sanctity frame elicited more disgust among

conservatives, which led to greater scores on all three of the outcome variables. Indeed, disgust is a

fundamental component of the sanctity/degradation moral foundation (Haidt, 2012). Therefore,

environmental concerns couched in sanctity frames are more likely to resonate as moral concerns

with conservatives, who are otherwise less likely to see environmental concerns as moral concerns.

Two similar studies expanded moral framing to appeal to authority and loyalty foundations

in addition to sanctity (Wolsko et al., 2016). One study found that conservatives exposed to a frame

appealing to sanctity, authority, and loyalty (e.g., "honor all of Creation [and] protect the purity of

America's natural environment…follow the examples of your religious and political leaders who

defend America's natural environment") reported greater conservation intentions and climate

change attitudes than conservatives exposed to a frame appealing to care and fairness (e.g., "help

reduce the harm done to the environment…make sure no one is denied their right to a healthy

planet", Wolsko et al., 2016). A follow-up study replicated those effects and also found that

conservatives exposed to a frame emphasizing sanctity, authority, and loyalty donated a greater

portion of their participation compensation to the Environmental Defense Fund than participants

exposed to a frame emphasizing only care and fairness (Wolsko et al., 2016). Mediation analyses

suggested that these effects were driven by in-group identity; conservatives were more likely to

perceive that the sanctity/authority/loyalty frame came from an in-group member than did the

care/fairness frame, which in turn led to greater scores on all three of the outcome variables. These studies further bolster the claim that conservatives are more likely to perceive environmental concerns as moral concerns when environmental concerns are couched in frames that resonate with their moral foundations. Therefore, it is apparent that moral reframing might be one promising approach to environmental communication with a skeptical conservative audience.

Laudato si' and Moral Foundations

Laudato si' was widely praised for framing global climate change mitigation as a moral obligation. Prominent newspapers such as *The New York Times, The Seattle Times,* and *The Baltimore Sun* referenced the encyclical's moral framing as a potential step toward bridging the climate change divide (Cloutier, 2015; Goodstein & Gillis, 2015; Sundborg & Frumkin, 2015). Politicians and scientists anticipated whether this moral reframing, paired with the Pope's authority over his conservative leaning Catholic constituency, would sway some climate change skeptics (Cama, 2015; Wisniewski, 2015)

Indeed, Because it appealed to multiple moral foundations, Pope Francis's message in *Laudato si'* should have been especially effective (Maxwell & Miller, 2015). Whereas environmental concerns have typically been framed as issues of care and fairness, the encyclical also frames them as issues of sanctity, loyalty, and obedience to authority[2].

Care. *Laudato si'* includes many appeals to the care foundation. The effects of climate change on the poor and vulnerable are emphasized throughout the encyclical. Both decades-old arguments (e.g., climate change will especially burden future generations) and newer arguments (e.g., climate change will increase the number of refugees) are used to demonstrate that caring for others requires caring for the environment.

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[2] Liberty vs Oppression, the most recent addition to Moral Foundations Theory is not included in this analysis. Indeed, many rhetorical strategies to counter environmental appeals use the liberty/oppression foundation. We will address this in future work.

Fairness. *Laudato si'* also appeals to the fairness foundation, often in tandem with care. By juxtaposing excessive resource consumption by "the richest countries of the world" with "repercussions on the poorest areas of the world," Pope Francis suggests that climate change and its effects on the poor and vulnerable are the results of "unequal distribution of available resources" (2015, pp. 35, 37)

Appeals to care and fairness are not unique to *Laudato si'*. In fact, many of these appeals within the encyclical are in concert with what environmental activists have been emphasizing for years (Dunlap & Van Liere, 1978; Feinberg & Willer, 2013; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Given that such appeals are more likely to resonate with liberals who are already concerned about climate change and support action than with skeptical conservatives, the encyclical likely would have been dismissed by climate change skeptics if it only appealed to care and fairness (Feinberg & Willer, 2013). Therefore, appeals to sanctity, loyalty, and authority, if present, have the potential to distinguish *Laudato si'* from other forms of environmental communication.

Sanctity. One striking passage from *Laudato si'* appeals to the sanctity foundation: "The earth, our home, is beginning to look more and more like an immense pile of filth" (Francis, 2015, p. 17). Blunt rhetoric such as this would be expected to elicit disgust, a crucial component of sanctity. This passage appeared to resonate with both individuals and the media as it was retweeted over 40,000 times and used in headlines by *The Guardian, CBS,* and *Huffington Post*. Notably, this imagery is very similar to imagery used in previous experiments that found sanctity frames bolstered pro-environmental attitudes, support for pro-environmental legislation, and belief in global warming among conservatives (Feinberg & Willer, 2013).

Loyalty. Some of the arguments in *Laudato si'* are framed as issues of loyalty and solidarity with others. Pope Francis writes about how we should "cultivate a proper relationship with [our] neighbor" (2015, p. 52). He also makes the important connection that caring for ourselves and

nature is "inseparable from fraternity…and faithfulness to others" (2015, p. 52) At an abstract level, this passage acknowledges that concern for nature should not be considered separately from duty to each other. There is enough ambiguity in this message that both liberals and conservatives can agree with it; liberals can claim that concern for nature is part of our duty to each other, whereas conservatives can claim that concern for nature must not preclude our duty to each other. Indeed, that is one of the more effective conservative arguments *against* climate change action: it would hurt the less fortunate via increased energy costs, tax burdens, and unemployment ("In their own words: 2016 presidential candidates on climate change," 2016).

Authority. "Authority" was one of the buzzwords surrounding the release of *Laudato si'*. Both *Time Magazine* and the *BBC* highlighted how Pope Francis's moral authority lent additional weight to his message (Hale, 2015; Usher, 2016). Pope Francis also invoked the teachings of historical figures venerated by many Catholics, such as St. Francis of Assisi and Saint John Paul II (2015, pp. 5, 9). This was an important strategy because environmental advocates such as Al Gore and other celebrities hold little authority over Catholic conservatives—not to mention conservatives in general—and polarizing figures are seldom successful at persuading their ideological opposites (McCright & Dunlap, 2011). Instead, by invoking his own authority as well as that of popular figures revered by many Catholics, Pope Francis might have appealed to conservative Catholics.

There are good reasons to believe this strategy could be successful. Conservatives typically value deference to authority to a greater extent than liberals (Haidt & Graham, 2007; Wolsko et al., 2016). Among conservative Catholics, who are members of a religious denomination with a clear authoritative leader, it was expected that deference to authority could drive climate change attitude change. In other words, perhaps the appeal of the leader of the Catholic Church and several beloved Church figures might be enough to change attitudes when years of preaching from partisan figures with no authority over Catholics (e.g., Al Gore, climate activists) could not.

Overview

Pope Francis's appeals to sanctity, loyalty, and authority demonstrate that *Laudato si'* was not just a green call to arms, but rather a wide-ranging document backed by decades of Catholic teaching regarding the environment and its relationship to human life (Allen Jr., 2015). Whether the encyclical's "distinctly Catholic shade of green" actually resonated as a unique environmental argument is a question of rhetoric and response (Allen Jr., 2015).

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Study 1: Moral Appeals in *Laudato Si'*

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In Study 1, we used content analysis to examine the extent to which *Laudato si'* emphasized each of five moral foundations.

Because it allows for uncovering patterns in raw transcripts, content analysis is a useful method for examining texts relevance to particular moral foundations (Vaisey & Miles, 2014). One such tool is the Linguistic Inquiry and Word Count program (LIWC), which allows users to create theory-relevant dictionaries containing specific word categories and count words within texts that correspond to those categories (Pennebaker, Boyd, Jordan, & Blackburn, 2015). Graham and colleagues (2009) created a LIWC dictionary of five moral foundations categories (care, fairness, loyalty, authority, and sanctity) to determine whether sermons from conservative and liberal congregations appealed to divergent moral foundations. Here, we use the Moral Foundations dictionary to determine the percentage of words in *Laudato si'* corresponding to each moral foundation and then we compare those percentages to another famous appeal for environmental action, *An Inconvenient Truth* (Guggenheim, 2006) to examine whether the distribution of references to each foundation is unique.

However, it is highly unlikely that the general public learned about the Pope's messages form reading the encyclical itself. Instead, it was most likely that what the public knows about the encyclical came through the media. The media could have chosen to frame content in in a way that

matches the moral framework of the encyclical, or they may have emphasized the moral foundations differently. Moreover, the way in which media outlets framed the encyclical could vary depending on the ideology of the outlet's readership.

We had the following research questions and hypotheses for Study 1:

RQ1: To what extent did the encyclical reference each of the moral foundations?

RQ2: Did the encyclical reference a broader moral framework than An Inconvenient Truth?

RQ3: To what extent did the media's framing of the encyclical reference each foundation, and did this vary based on the ideology of the outlet's readers.

Method

We operationalized "the extent to which each moral foundation is referenced" as the number (or percentage) of moral words that correspond to each of the five dimensions using the Moral Foundations dictionary created by Haidt and his colleagues and customized for the LIWC2015 computerized text analysis software. The Moral Foundations dictionary contains 295 words that each correspond to one or more of five foundations. Using the dictionary, LIWC2015 counts how many times words relating to the five moral foundations occur in a document and converts each foundation word count to a percentage of the total document word count. The percentages can then be compared to determine the relative emphasis of each foundation. Since its original application analyzing conservative and liberal sermons (Graham et al., 2009), this dictionary has been validated across studies examining political attitudes, in-group loyalty, and even papal encyclical rhetoric preceding Laudato si' (Day, Fiske, Downing, & Trail, 2014; Leidner & Castano, 2012; Waytz, Dungan, & Young, 2013; Zängle, 2014).

Results

LIWC2015 counted 42,734 total words in *Laudato si'* Percentages for each moral foundation

category are included in Table 1. Our first hypothesis was that Laudato si', like other environmental

appeals, would emphasize the care foundation. Consistent with this hypothesis, the care foundation

was emphasized the most (0.88%)—at least twice as much as every other individual foundation (see

Figure 1a).

Table 1.

Foundation	Example Words	Percentage
Care vs. Harm	Care, protect, harm, suffer, preserve, destroy	0.88%
Fairness vs. Cheating	Fair, justice, balance, equal, dishonest, prejudice, unjust	0.28%
Loyalty vs. Betrayal	Together, nation, home, family, foreign, disloyal, unite, joint	0.38%
Sanctity vs. Degradation	Purity, clean, sacred, maiden, virtuous, dirty, sin, filth	0.24%
Authority vs. Subversion	Obey, honor, duty, serve, abide, rebel, disrespect, oppose	0.35%

One proposed strength of this encyclical was that in addition to the typical care and fairness

arguments offered, *Laudato si'* offered frames centering on sanctity, loyalty, and authority. However,

it is possible that the strong emphasis on care overshadowed references to the other foundations. A

chi-square test suggests that *Laudato si'* references the care and fairness foundations (approximate

word count = 497) significantly more than the combined references to sanctity, loyalty, and

authority (approximate word count = 416, $X^2(1) = 7.186$, $p=.008$.

Comparison to *An Inconvenient Truth*. Even though *Laudato si'* heavily emphasized care

foundation—which is suspected to be the case for many appeals for climate change action, it is

possible that the encyclical emphasizes the other four moral dimensions more than other works. To

explore this possibility, we compared the text of the encyclical to *An Inconvenient Truth* (Guggenheim,

2006). Using an online transcript of the documentary, we analyzed the text with the Moral

Foundations Dictionary. Then, we converted the percentage of words referencing each foundation out of the total document to the percentage of words referencing each foundation out of the total number of moral words referenced (*Laudato Si'* = 913 moral words; *An Inconvenient Truth* = 83 moral words[3]; see Figure 1b). A chi-square test confirmed that the relative distribution of references to the moral foundations was different between the two sources, $X^2(4) =2\ 9.78, p < .001$. Like *Laudato si'*, *An Inconvenient Truth* emphasized heavily emphasized the care foundation relative to the other moral dimensions, but unlike the encyclical, it placed equal emphasis on the loyalty foundation. *Laudato si'*, however, more heavily emphasized fairness and sanctity relative to the other moral dimensions than did *An Inconvenient Truth*. Thus, although we find that *Laudato si'* is tapping into more than one moral foundation, we do not find support for the hypothesis that it is unique in doing so.
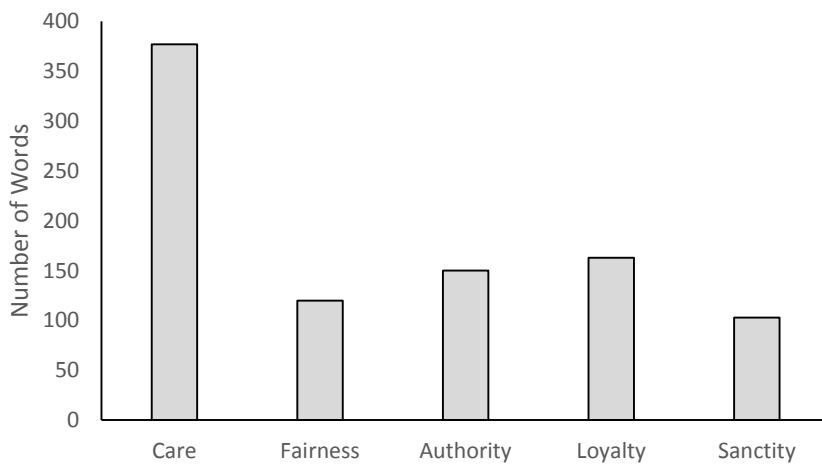

Figure 1a. Number of words applicable to each of five moral foundations referenced in the papal encyclical, *Laudato si'*: On Care for Our Common Home.

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[3] For this analysis we removed the word "united" from the dictionary as An Inconvenient Truth makes several references to the United States.
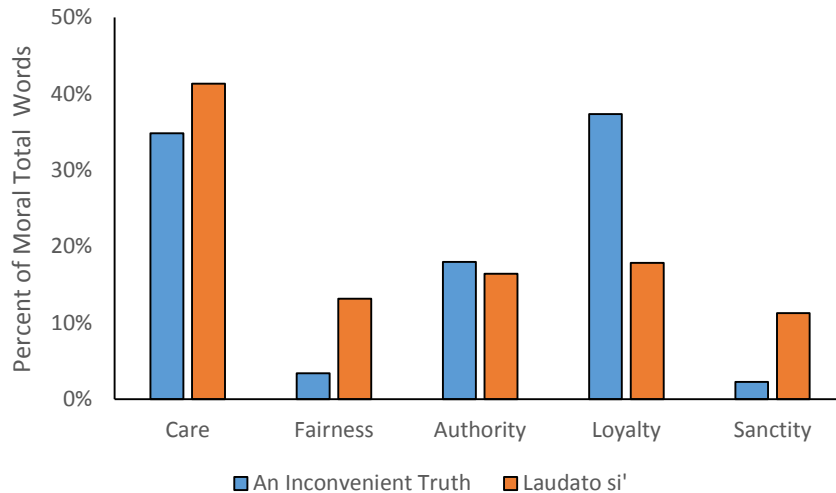
Figure 1b. Proportion of total moral words used in *Laudato si'* versus in Al Gore's "An Inconvenient Truth"

Authority Supplementary Analysis with *Laudato* si'. Some of the authority appeal in *Laudato si'* is derived from Pope Francis's position as leader of the Catholic Church rather than from the external authorities he appealed to in the encyclical. It is important to examine the extent to which Pope Francis's writing conveys his own authority in addition to the moral authority of God, the Church, and religious figures such as St. Francis and St. John Paul II. Therefore, we conducted a supplementary analysis using the standard LIWC2015 dictionary rather than the Moral Foundations dictionary. Importantly, LIWC2015 includes a summary category that measures the extent to which an author writes from a position of expertise and confidence, also known as *clout* (Pennebaker et al., 2015). Given that clout was validated in a series of studies regarding rank and status in social hierarchies, it served as a useful surrogate for authority for the supplementary analysis.

The supplementary analysis revealed that *Laudato si'* scored high on the clout scale (74.78 of 100). These comparisons reveal that *Laudato si'* conveyed significant expertise and confidence. Put differently, *Laudato si'* did not just appeal to external authorities such as God, the Church, and St. Francis and St. John Paul, but also conveyed Pope Francis's considerable authority as the leader of the Catholic Church.

Discussion

Study 1 aimed to examine the extent to which *Laudato si'* emphasized each of five moral foundations. There are some limitations with using this dictionary that are important to take into consideration when interpreting this analysis. First, the program and dictionary focus only on specific words that have been designated as applying to one more of the foundations as opposed to taking into consideration phrases, entire frames, or broader context. Indeed, many of the Pope's moral arguments would not be picked up by this dictionary. For instance, his argument that climate change will increase the number of refugees fleeing from their nation to nations less affected by climate change is an appeal to the care foundation; however, no words in this phrase would be picked up by the dictionary.

Second, while this analysis to some extent captures the moral language of the encyclical, itself, the encyclical is not the source of most of the public's awareness of the Pope's messages. Instead, most members of the public became aware of the encyclical's arguments through media outlets. Ongoing analyses aim to capture how these arguments were framed by the media outlets and to what extent that influenced the public's agreement with them.

These points aside, the content analysis provided preliminary evidence that *Laudato si'* appealed to at least five moral foundations. Care frames were most prevalent, but frames of the other four moral foundations were featured to a non-trivial extent. Emphasis on sanctity, loyalty, and authority, were important emphases as these foundations are the ones most likely to resonate with conservatives.

Study 2: Did the Moral Messages in *Laudato Si'* Resonate with Conservatives?

Given that Laudato Si' appealed to multiple moral foundations, as shown in Study 1, we set out to use survey data to determine to what extent people—of varying ideologies—agreed with those moral messages. Indeed, ideology is important to take into consideration not just because it

predicts which moral frames will resonate most with that subgroup, but also because it can influence

whether the source of those frames will be perceived as credible (Druckman, 2001; Pornpitakpan,

2004). Therefore, we hypothesized that to what extent respondents agreed with each of the Pope's

moral arguments would depend on three factors: (1) their perceptions of the Pope as a moral

authority, (2) their beliefs about whether climate change is human-caused, and (3) their political

ideology.

Method

   Sample. The data used in this study come from the 2015 Annenberg Papal Visit Study,

fielded for the Annenberg Public Policy Center at the University of Pennsylvania by Abt/SRBI.

Surveys were conducted with U.S. individuals via telephone interview. The Pre-Visit cross-sectional

survey (N = 1,778) used an overlapping dual frame random digit dial (RDD) sample design and

included an oversample of Catholic respondents. Of the full sample, 624 completed the interview

over landline and 1,154 completed the interview over cell phone. The survey took place between

September 1 and September 20, 2015.

   Socio-Demographics. Because Pope Francis's influence on Catholics was of particular

interest to the broader survey, this demographic was oversampled (n = 529, 42%). Regarding race

and ethnicity, 1261 (71%) reported being white, non-Hispanic, 150 (8.4%) reported being black,

non-Hispanic, 99 (5.6%) reported being Hispanic, 54 (3%) reported being Asian, 30 (1.7%) reported

being American Indian/Alaska Native, 8 (0.4%) reported being Pacific Islander, 19 (1%) reported

being biracial, and 35 (1.9%) reported being of another race or ethnicity, or chose not to provide

such information. Nearly half of our sample (n = 850, 47.8%) was recorded as being female. The

sample ranged in age from 18 to 97 years old (*Mean* = 51.97 years, *Median* = 54 years, *SD* = 18.13).

We also collected information about people's educational levels, which was converted into

approximate years spent in school excluding pre-k and kindergarten (*Mean* = 15.15 years, *Median* = 14 years, *SD* = 3.04).

Variables. The raw survey questions relevant to the current analysis are reported in Table 2. Importantly, these items represent four of messages that Pope Francis included in the encyclical that appeal to moral foundations: (1) humans have a moral obligation to act to address climate change; (2) climate change will disproportionately affect the poor; (3) climate change will increase the number of refugees, and (4) respecting God's creation includes acting to minimize the effects of climate change. The moral content of each of these arguments is discussed in more detail in the results.

In addition to these items, we created an index of political ideology (Zpolyideo) by averaging the standardized responses on three items: a 7-point scale of political affiliation (strong democrat, democrat, lean democrat, moderate/independent, lean republican, republican, strong republican), a 5-point scale of ideology with respect to economic issues, and a 5-point scale of ideology with respect to social issues, and then standardizing this average. For these 5-point ideology scales, respondents were asked the following: In terms of social/economic issues, would you say you are very conservative, somewhat conservative, moderate, somewhat liberal, or very liberal. The order of the social and economic ideology ratings were randomized as well as the order of the response options (e.g., for some the responses started with very conservative, for others the responses started with very liberal). We also included an index of papal credibility which included averaging the standardized responses across two items: one asking how credible respondents perceive Pope Francis to be when talking about the moral obligation to act to address climate change and one asking how credible respondents perceive Pope Francis to be when talking about the moral obligation to help the poor. Both of these items were answered on a five-point scale with 5 representing very credible and 1 representing not credible at all.

Table 2. Relevant raw survey items asked to respondents.

Variable	Question Text	Descriptives
position	On another topic, from what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past few decades or not? ** *if participant responded yes* Do you believe the earth is getting warmer mostly because of: Human Activity such as burning fossil fuels (humn) Natural Patterns in the earth's environment (natur) **if participant responded no* Do you think that we just do not know enough yet about whether the Earth is getting warmer (i.e., dnk) or do you think it is just not happening that the earth is getting warmer? (i.e., notHap)	humn = 838 natur = 267 dnk = 272 notHap = 179
ccpoor	How accurate is it to say that climate change will have a greater effect on the poor than on those in better economic circumstances: (4) Very Accurate, n=599 (3) Somewhat Accurate, n=539 (2) Not too Accurate, n=224 (1) Not Accurate at all, n=367	M = 2.79 SD = 1.13
morOb	Do you agree or disagree with the following statement: Humans have a moral obligation to act to address climate change. Do you (5) Strongly Agree, n=797 (4) Somewhat Agree, n=429 (3) Neither Agree nor Disagree, n=172 (2) Somewhat Disagree, n=153 (1) Strongly Disagree, n=202	M = 3.84 SD = 1.38
ccRefugee	For each of the following statements, tell me whether you agree or disagree with it. Here's the first/next: Climate change across the globe will increase the number of people feeling to countries less affected by climate change. Do you: (5) Strongly Agree, n=338 (4) Somewhat Agree, n=408 (3) Neither Agree nor Disagree, n=259 (2) Somewhat Disagree, n=304 (1) Strongly Disagree, n=409	M = 2.98 SD = 1.47
respGodCC	Here's the first/next: Respecting God's creating includes acting to minimize the effects of climate change. Do you: (5) Strongly Agree, n=477 (4) Somewhat Agree, n=443 (3) Neither Agree nor Disagree, n=260 (2) Somewhat Disagree, n=180 (1) Strongly Disagree, n=216	M = 3.50 SD = 1.38

Results

To examine our hypotheses, we conducted regression analyses predicting agreement with each of four messages captured by the survey with papal credibility, political ideology, and climate change beliefs as predictors. See Table 3.

Table 3. Results from Regression Analyses for each of the four messages.

	1. MorOb		2. ccPoor		3. ccRefugee		4. respGodcc	
	B(SE)	p	B(SE)	p	B(SE)	p	B(SE)	p
Pope Credibility	0.22(.07)	<.001	0.17(.07)	.017	0.13(.08)	.102	0.16(.08)	.048
Human-Caused CC	0.49(.06)	<.001	0.19(.07)	.009	0.25(.08)	.002	0.18(.07)	.025
Political Ideology	-0.29(.06)	<.001	-0.24(.07)	<.001	-0.12(.06)	.129	-0.26(.08)	<.001
Pope X Human	-0.15(.07)	.054	-0.09(.08)	.286	-0.06(.09)	.448	0.03(.09)	.773
Pope X PolyIdeo	0.00(.07)	.966	0.08(.08)	.289	0.07(.08)	.425	0.18(.08)	.030
Human X PolyIdeo	0.13(.07)	.066	0.01(.08)	.869	-0.16(.09)	.070	0.20(.09)	.024
Pope X Human X PolyIdeo	0.00(.08)	.980	0.09(.09)	.9353	-0.10(.07)	.501	-0.25(.10)	.010

1. Humans have a moral obligation to act to address climate change. The most general message of Pope Francis's captured by the survey was that acting to address climate change is a moral obligation. This particular message appeals to morality generally, but also hints at the authority and loyalty foundations through the use of "obligation". Indeed, agreement with this message was significantly predicted by higher perceptions of papal credibility, belief in human-caused climate change, and it was negatively predicted by more conservative political ideology (see Table 3).

In addition, there was a trend towards interactive effects of climate change beliefs and perceptions of papal credibility such that the influence of papal credibility in predicting agreement was stronger on those who do not already believe climate change is human-caused. There was also a trend toward an interactive effect of political ideology and belief in human-caused climate change such that the influence of political ideology on message agreement was stronger for people who do not believe that climate change is human-caused (see Figure 2). What is particularly important to note here is that even people who do not support that climate change is human-caused show increased agreement with this message when they find Pope Francis to be credible. This suggests

that there is an opportunity for Pope Francis to leverage his credibility to move people to act on climate change, even if they do not believe it is human-caused.
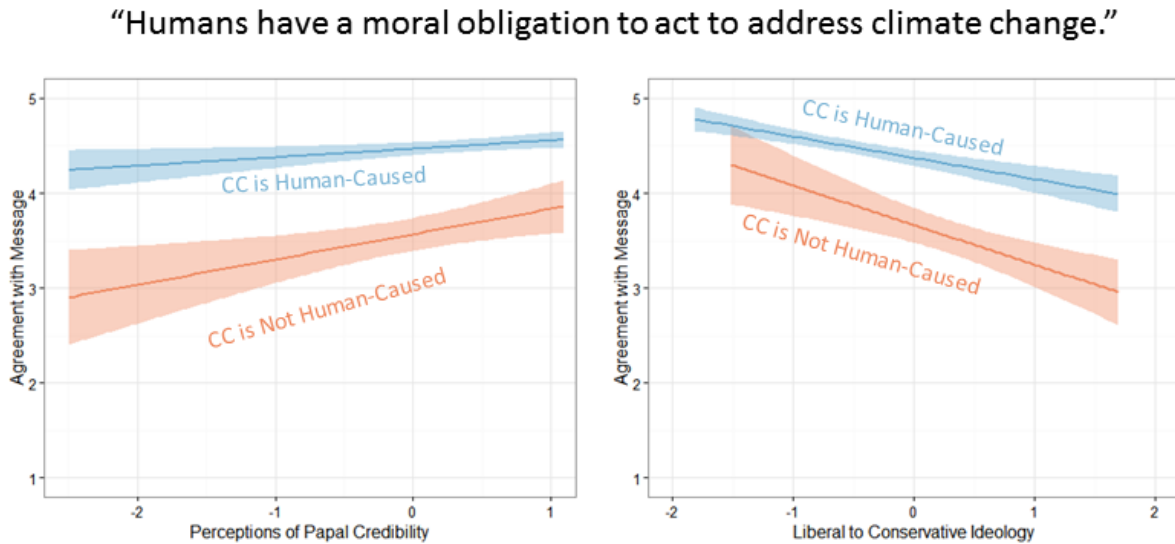
"Humans have a moral obligation to act to address climate change."

Figure 2. Plot on the left depicts agreement with moral obligation message by perceptions of papal credibility and whether respondents believed that climate change is human caused. Plot on the left depicts agreement with moral obligation message by liberal to conservative ideology. Shaded areas surrounding regression lines represent standard error.

2. Climate change will have a greater effect on the poor than on those in better economic circumstances. A second message of Pope Francis's was that climate change would disproportionately affect the poor. This particular message is the least likely to influence conservatives as it appeals primarily to the more liberal foundations of care and fairness. Although perceptions of papal credibility and belief in human-caused climate change both positively predicted agreement with the message, the strongest predictor was political ideology: people with more conservative ideology were much less likely to agree with this message than those with more liberal ideology (see Table 3). There were no other significant or trending effects (See Figure 3).
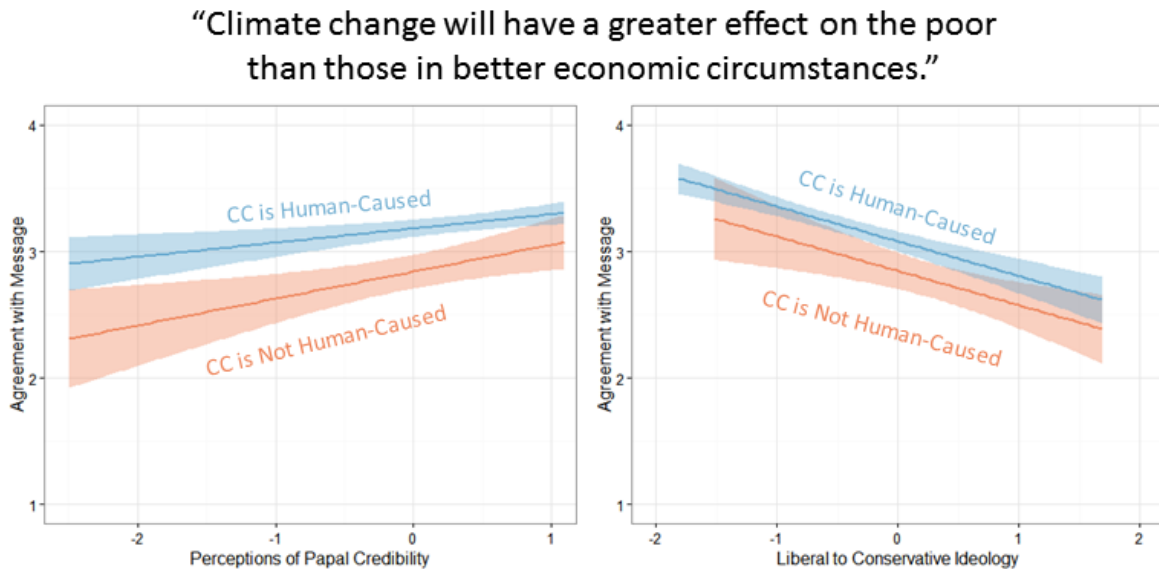
Figure 3. Plot on the left depicts agreement with the message by perceptions of papal credibility and whether respondents believed that climate change is human caused. Plot on the left depicts agreement with the message by liberal to conservative ideology. Shaded areas surrounding regression lines represent standard error.

3. Climate change across the globe will increase the number of people fleeing to countries less affected by climate change. Another message of Pope Francis's was that climate change would increase the number of refugees. This message could be interpreted in multiple ways. First, it could be interpreted through the lens of the lens of the care and fairness foundations (e.g., we need to act to prevent climate change to save those who are most vulnerable). Second, it could be interpreted through the more conservative lens of the loyalty foundation (e.g., we need to act to prevent climate change to stop refugees from migrating to our country). Thus, it was possible that this message could appeal more to conservatives than some of the others. Indeed, the only significant predictor of this item was whether respondents believed that climate change is human-caused—there was no significant main effect of ideology. However, there was a trend toward an interactive effect of climate change beliefs and political ideology, such that the influence of ideology on acceptance of the message was stronger for those who agree that climate change is human-caused than those who disagree (see Table 3).
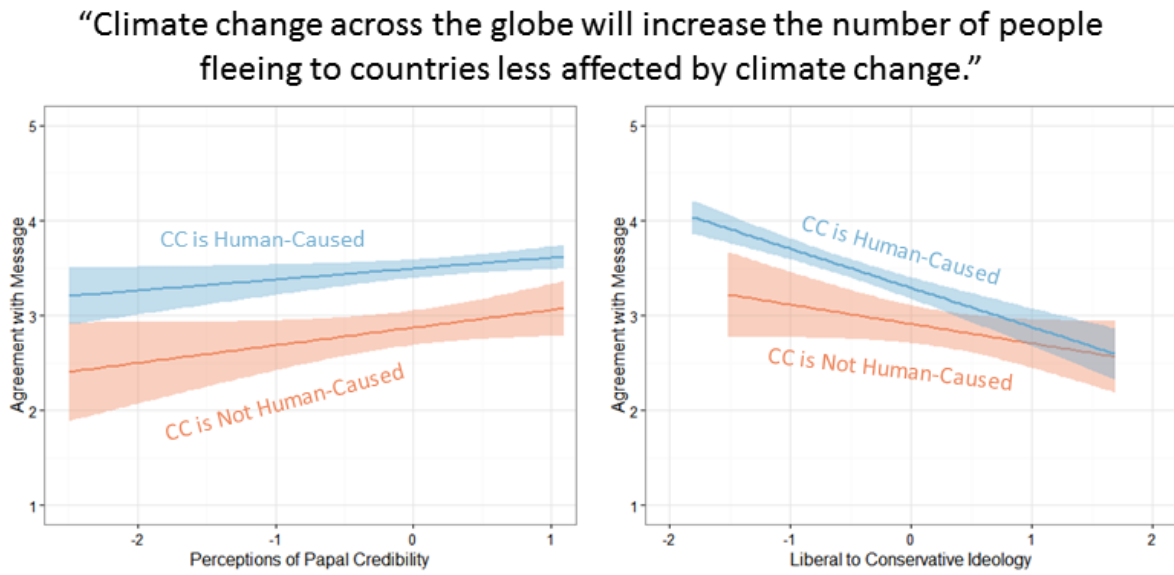
Figure 4. Plot on the left depicts agreement with the message by perceptions of papal credibility and whether respondents believed that climate change is human caused. Plot on the left depicts agreement with the message by liberal to conservative ideology. Shaded areas surrounding regression lines represent standard error.

4. Respecting God's creation includes acting to minimize the effects of climate change. The last message we discuss is the Pope's message that respecting God's creation includes acting to minimize the effects of climate change. This frame includes appeals to the moral foundations of sanctity and authority. For this analysis, almost all effects were significant. Pope credibility and beliefs in human-caused climate change both significantly predicted agreement with the message. In addition, conservative political ideology negatively predicted agreement. There was also interactive effects of political ideology with perceptions of papal credibility and with climate change beliefs. More importantly, there was a three-way interaction with perceptions of pope credibility, political ideology, and climate change beliefs. From the figure, we can see that increased papal credibility predicts increased agreement with the message for everyone except for liberals who don't believe in human-caused climate change.
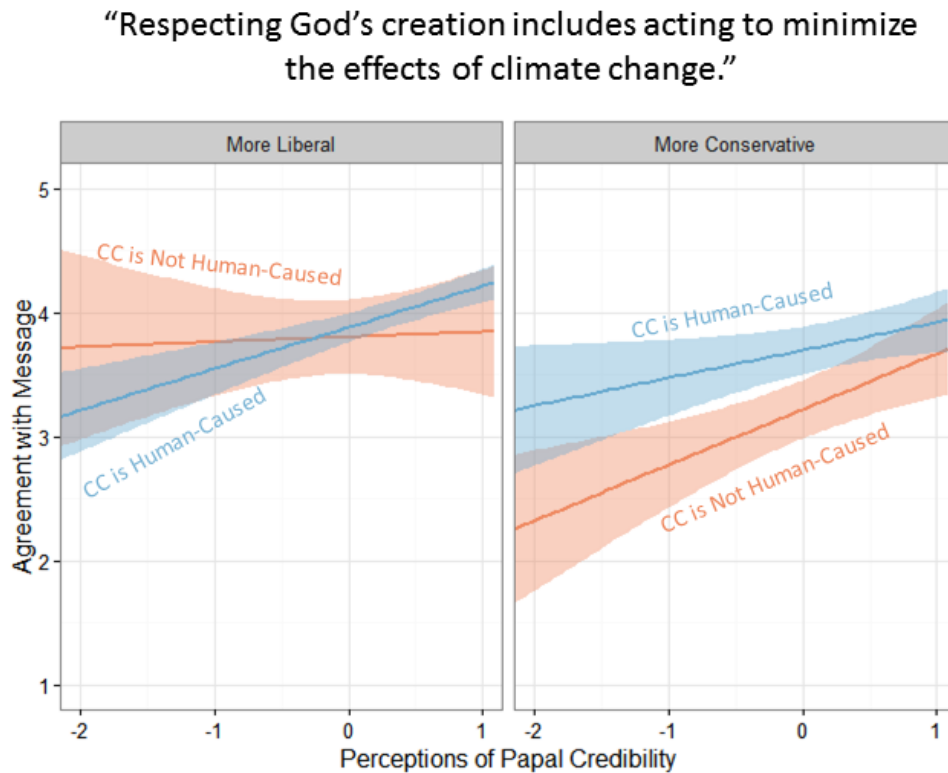
Figure 5. Three-way interaction of ideology by climate change beliefs by perceived papal credibility on agreement with the message. Shaded regions represent standard error.

Supplementary Analysis. In addition to examining which of the factors predicted agreement with the Pope's messages, we were also interested in determining if conservatives agreed with any one of the messages more than the others. In particular, we predicted that the messages referencing traditionally conservative foundations (e.g., Respecting God's Creation) would appeal more to conservatives than messages that appeal to traditionally liberal moral foundations (e.g., climate change will disproportionately affect the poor).

To examine this, we conducted an exploratory mixed-design ANOVA with message (MorOb, ccPoor, ccRefugee, respGodcc) as a within-subjects variable and ideology (more liberal, more conservative) and climate change beliefs (human-caused, not human-caused) as between-subjects variables. The ANOVA did not reveal a main effect of message, $F(3, 1476)=.689$, $p=.559$, $\eta_p^2=.001$, but it did reveal interaction effects with this variable. First, there was an interaction effect

between message and ideology, $F(3, 1476)=5.85$, $p=.001$, $\eta_p^2=.012$. This effect is likely driven by agreement with the "respecting God's creation" item: although liberals agreed with all of the items more than conservatives did, conservatives agreed most with this message while liberals agreed with this message the least. See Figure 6. There was also an interaction effect between message and climate change belief, $F(3, 1476)=7.04$, $p<.001$, $\eta_p^2=.014$. Among those who already accepted human-caused climate change, the moral obligation item resonated the most. In contrast, among those who do not accept that climate change is human-caused, the moral obligation item resonated the least.
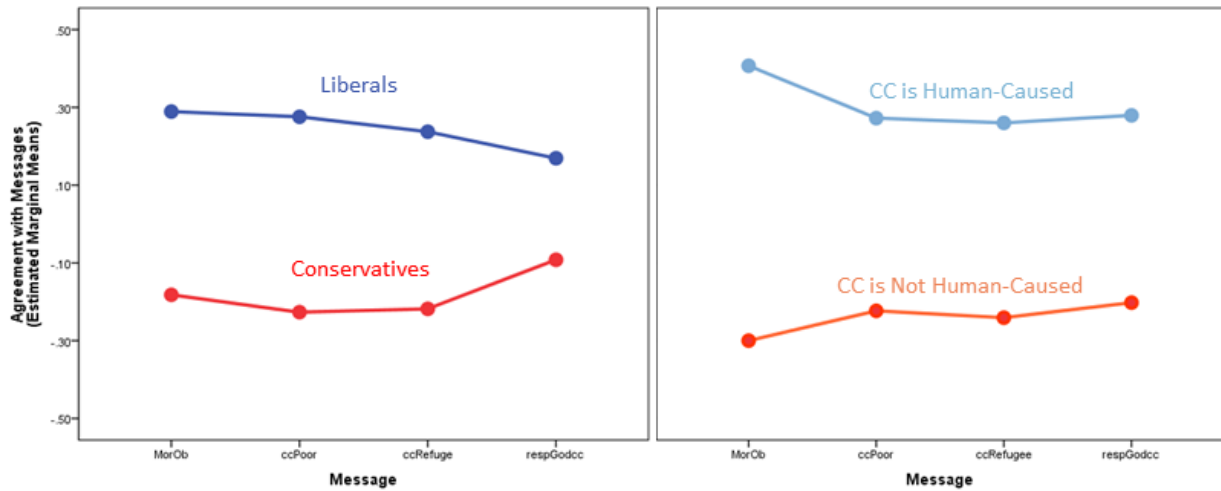

Figure 6. Images from supplementary analysis. Left image represents the significant interaction between message and ideology. Right image represents the significant interaction between message and climate change belief.

General Discussion

Pope Francis was not the first pope to address environmental issues: his predecessors Pope Benedict XVI, Pope John Paul II, and Pope Paul VI, made environmental appeals in previous encyclicals and apostolic letters dating back to 1971 (Benedict XVI, 2009; John Paul II, 1979; Paul VI, 1971). What is special about Pope Francis's encyclical, Laudato si': On Care of Our Common Home is its crucial timing, is that it was an authoritative document from a popular religious figure released just in time to influence the conversation leading up to the United Nations Climate Change conference (i.e., COP21). *Laudato Si'* and Pope Francis's accompanying September 2015 visit to the United Nations were seen as important events "paving the way" for the UN agreement to curb carbon emissions and set a 2°C ceiling on global warming (Walt, 2015).

But in order for the encyclical to have a real effect, its messages had to resonate with those who were not already concerned about climate change. One way to do this was to appeal to climate change skeptics' moral sensibilities in a way that had not yet been tapped. It has been argued that most calls for action to minimize the effects of climate change have continued to appeal to care and fairness foundations. Yet, these are not the foundations that resonate most with conservatives. By situating the call to action in a broader moral framework, Pope Francis could have moved more conservatives to support climate change action.

However, did the encyclical appeal to a broader moral framework? Although Pope Francis arguably made claims that were consistent with five of the moral dimensions in Moral Foundations Theory, preliminary analyses show that by in large, the encyclical still appealed primarily to the liberal foundations of care and fairness—the foundations least likely to appeal to conservatives. Yet, the type of content analysis that we used in Study 1 only captured the appearance of specific words and not the broader moral frames presented in the encyclical. Moreover, it is not reasonable to assume that the general public became aware of these arguments by reading the encyclical. Instead,

people likely heard these arguments through various media outlets. Ongoing analyses aim to capture the moral frames used by the media and examine how this influences people's agreement with these messages.

By in large, the general public believes climate change is occurring (72% of our sample) and about half believe that it is human-caused (49% of our sample). What is most contentious is whether and what we should do about it. Two of the Pope's moral frames examined in the survey data used in this study directly capture beliefs about acting to address climate change (i.e., humans have a moral obligation to act to address climate change and respecting God's creation includes acting to minimize the effects of climate change). Even among those who do not agree that climate change is human-caused, there are people who support these frames. Our regression analyses indicate that this is particularly true for people who find Pope Francis to be credible: while those who already believe climate change is human-caused agree that acting to address climate change is a moral obligation, agreement with this message increases among those who do not believe in human-caused climate change as a function of how credible they find the pope to be.

Insofar as *Laudato si'*s "shrewd arguments…pricked the consciences of ordinary Catholics," our research suggests that the encyclical resonated with moral foundations particularly important to religious people – sanctity, loyalty, and authority (Vallely, 2015). Environmental appeals often ignore these foundations. Yet one of the keys to persuading climate change skeptics is to ground the argument in these foundations (Feinberg & Willer, 2013; Markowitz & Shariff, 2012; Wolsko et al., 2016). Pope Francis understands the morals of his Catholic followers, many of which are shared with other religious denominations. He understands that they often are moved by respect for authority, loyalty to their group, and the unique sanctity of human life and the natural world. By framing *Laudato Si'* according to these morals, he might have shifted the climate debate toward solutions that otherwise would remain elusive.

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