Low Religion or No Religion?
Improving Research with the Logic of Machine Learning

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Abstract: Social science research is interested in the growing number of Americans who express no religious affiliation on surveys, but concerns about underreporting, misreporting, and inconsistency in lived religion raises a question about our most common survey measure of nonreligious self-identification. What is the predictive validity of our current explanations for why people disaffiliate? I advance the current literature using a logistic regression model for no religious affiliation fit on eleven samples from the General Social Survey (1988-2014) to predict respondents' affiliation in the 2016 and 2018 samples. Results show our explanations can yield a fairly accurate predictive model, but errors are important and informative. The model is more likely to misclassify religiously unaffiliated respondents as affiliated. Analysis using model estimates shows that selection effects into non-affiliation explain differences in political views on culture wars issues. These findings challenge the use of categorical measures for nonreligion alone, because they suggest that measures of "low religion," rather than "no religion," are more useful for researchers seeking to overcome survey measurement error in studying this group.

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The rising number of Americans with no religious affiliation has gained much attention from the social science of religion over the last decade (Smith and Cragun 2019). One of the most important recent insights about this group is that it is much more diverse than originally expected. Where once it was a stock phrase to say that the unaffiliated were more likely to be white, male, and highly educated, for example, new research is showing that many of these claims describe *strong and distinct* nonreligious identifications, such as atheism, rather than the unaffiliated as a whole. This work highlights variation in race and ethnicity (Baker 2020; Hutchinson 2020), gender (Edgell, Frost, and Stewart 2017), and social class (Ammerman in press) among the unaffiliated.

This variation is important because it raises two methodological challenges for future research on the unaffiliated. First, many studies of this group rely on survey measures of religious self-identification that are prone to three sources of measurement error: underreporting due to social desirability bias (Gervais and Najle 2018; Stewart 2016), misreporting due to both real changes in affiliation and respondent error (Hout 2017), and the reality that religious experiences do not necessarily fit neatly into clear categories of religious or nonreligious identification (Ammerman 2020; Edgell 2012; Chaves 2010). These sources of error create misclassifications, making categorical comparisons of religious identity groups difficult (Stewart in press).

Second, many studies use non-affiliation as an independent variable to make group comparisons on social outcomes and political views (Baker and Smith 2015; Burge 2021; Campbell, Layman, and Green 2021; Frost and Edgell 2018). This is a logical step to take as more Americans report no religious affiliation, but it is also troubled by potential selection bias (Regnerus and Smith 2005) — is it the categorical status of "no religion" that drives group

differences, or is it the social, political, and demographic correlates of "low religion" that condition selection into the unaffiliated?

Research on the unaffiliated has to contend with these issues of misclassification and selection bias. In what direction do these biases run? On the one hand, there is some evidence that researchers have been too hasty to label people as nonreligious when they are substantively religious. They just believe without belonging (Davie 1990; Hout and Fischer 2002). Or, they miss church, but say they went in order to signal their religious identities (Brenner and DeLamater 2016; Hadaway, Marler, and Chaves 1993). On the other hand, there is also evidence that we may be too hasty to label someone as religious when they are substantively nonreligious. There are also people who "belong without believing" (Kasselstrand 2015). Just as people have unique religious experiences, they may also have unique nonreligious experiences (Frost 2019). Studying where our theories of religious identity fall short can improve our measurement of religion in society and help us to clarify whether we are over-stating or under-stating the sociopolitical impact of religious disaffiliation.

To date, the literature has addressed these problems by adding depth to our original classification categories, both through in-depth qualitative interviews and through the creation of disaggregated sub-categories such as "unchurched believers," "nothing in particular" respondents, and the "spiritual but not religious" (Baker and Smith 2015; McClure 2017; Thiessen and Wilkins-Laflamme 2020; Zuckerman 2011). These strategies are useful because they bring researchers' analytic categories more closely in line with the reality of people's lived experiences– if more people feel the categories fit their experiences, they may be more likely to select them. If there is any ambiguity in the way researchers and respondents understand these

categories, however, adding more categories could further complicate these issues by inflating measurement error.

This paper proposes a different approach to compliment these findings by moving in the opposite direction. My main research question is: what is the predictive validity of our current explanations for religious non-affiliation? I consider what we can learn about the unaffiliated category when we predict respondents' religious identities and examine patterns in how those predictions fall short. In the following sections, I review what we know about challenges in measuring nonreligion and six core explanations for religious non-affiliation. I address this question in three parts by a) testing how good our theoretical models are at predicting non-affiliation, b) evaluating who these models tend to misclassify as "religious" or "not religious," and c) evaluating the extent to which selection into non-affiliation confounds our estimates of attitudinal differences between religious and nonreligious groups.

I conduct three analyses to answer these questions using the General Social Survey (GSS). These analyses are unique from previous literature in three ways. The first uses the logic of test and training data in a machine learning approach to data analysis (James et al. 2013). I fit a logistic regression model on eleven waves of the GSS as training data, and then use that fitted model to predict religious disaffiliation using two waves as test data. This way, I can assess the relative completeness of our set of explanatory factors for disaffiliation, generate multiple sets of predicted nonreligious affiliations based on different model thresholds, and then compare those predictions to the actual reported affiliation of respondents in the 2016 and 2018 samples.

The second analysis provides an extensive focus on model *error*, giving us unique insight into where our current explanations go wrong. Specifically, I examine how this predictive model tends to misclassify people – does it tend to label people as affiliated when they are actually not,

or vice versa? Doing so helps extend our understanding of how to parse differences between people with low religious commitments and no religious affiliation.

In the third analysis, I revisit earlier research and test problems with selection into non-affiliation in the modeling of nonreligious groups. What is a better predictor of attitudes – actually being unaffiliated, or being highly likely to identify as unaffiliated according to the predictive regression model? Using a regression adjusted approach to modeling selection with model predictions (Morgan and Winship 2015), I show that differences in attitudes toward major culture wars issues such as abortion and same-sex marriage—two issues where the literature expects stark differences between affiliated and unaffiliated respondents—are better explained by selection into the unaffiliated group than non-affiliation itself.

I conclude with a discussion about what we can do to improve the study of religious identity and the measurement of nonreligion is large surveys. Previous work lays a foundation for including additional measurement categories for different kinds of nonreligious respondents (Baker 2021). Here, I outline a parallel, alternative strategy using continuous measures that does not rely on cultural congruence between the labels that researchers pick and the labels respondents use. Instead, this approach to modeling selection into nonreligion provides a new way to use classic survey data on religious disaffiliation in the absence of these additional categorical measures.

Measuring Nonreligion in Survey Research

Most studies of religious disaffiliation and nonreligion using survey research methods rely on a self-identification measure where respondents select "none," or related sub-categories, on a question assessing religious affiliation (Baker and Smith 2015; Edgell et al. 2017; Hout 2017; Hout and Fischer 2002, 2014; Thiessen and Wilkins-Laflamme 2020; Vargas and

Loveland 2011). The sociology of religion is especially interested in categorical distinctions between religious groups, including denominations (Steensland et al. 2000), and so this approach is useful to make similar comparisons and to disaggregate the unaffiliated into subcategories including atheists, agnostics, people who are "nothing in particular," and more. However, there are three issues that make this approach challenging for researchers interested in nonreligion: underreporting, misreporting, and inconsistency in lived religion.

Underreporting occurs due to social desirability bias, where people conceal their actual nonreligious identification due to stigma. The most publicly visible nonreligious subgroup is atheists, due to mobilization efforts to codify atheist identity groups for mutual support. In the U.S., anti-atheist bias is persistent and durable (Edgell, Gerteis, and Hartmann 2006; Gervais, Shariff, and Norenzayan 2011) and there is evidence that these attitudes spill over to structure attitudes about other nonreligious groups (Edgell et al. 2016, 2017). There is evidence to suggest that there may be general underreporting of religious non-affiliation, in line with observed patterns of underreporting in atheist self-identification (Gervais and Najle 2018; Stewart 2016; Yukich and Edgell 2020).

Misreporting occurs when people select an identification option that does not fit their actual religious or nonreligious experience. This could be because they are in the middle of a process of genuine religious switching where changes in practice may lag changes in belief or identification (Keysar 2014; Sherkat 2014; Winchester 2008). This could also be measurement error in which respondents do not consistently report their actual identification. Lim et al. (2010) identify "liminal nones" who change their identification, and Hout (2017) estimates that about twenty percent of Americans demonstrate this kind of liminality. If we add too many additional subcategories for religious non-identification to a survey measure, especially if researchers and

respondents do not agree on what these categories mean in practice, we risk increasing measurement error by providing additional options with a relatively equal probability of selection.[1] Finally, misreporting also occurs when people choose to report their religiosity in a way that that matches their identity, even if it does not match patterns in their behavior (Brenner and DeLamater 2016; Hadaway et al. 1993). This last consideration is especially important, because it relates to a separate theoretical challenge to our measurement approaches based on religious experience.

Perspectives on lived religion emphasize how people approach religion pragmatically, and so religious inconsistency is an integral part of the way they experience the world (Ammerman 2020; Edgell 2012). Assuming that people are "really religious" only when they express their beliefs, practices, and affinities in a consistent and tightly integrated way is a fallacy (Chaves 2010), and so researchers need to take into account the possibility that people who initially appear nonreligious may in fact be substantively religious. These include people researchers label "unchurched believers" or those who "believe without belonging" (Baker and Smith 2015; Davie 1990; Hout and Fischer 2002) and people who maintain spiritual practices but

[1] We can show this mathematically with a classic formula using entropy to account for information conveyed in a system of binary, categorical choices (Shannon 1948; Shannon and Weaver 1998). The free selection among equally plausible choices on the respondents' end increases the information conveyed in a survey question, but also increases uncertainty on the researchers' end (Cole 1993). Imagine a person has four self-identification options for nonreligion on a survey question: "nothing in particular," "spiritual but not religious," "atheist," and "agnostic." For a strongly identified nonreligious respondent who identifies as an atheist, it is easy to answer this question, and we would expect a high probability of selecting one category (say, a 97% probability of choosing atheist and 1% probability of choosing each other option). Mathematically, we could write this as $H = -\Sigma(.97\log(.97) + .01\log(.01) + .01\log(.01) + .01\log(.01))$, or an entropy score of $H = 0.07$. But a respondent who is vaguely unaffiliated, someone who has a more equal likelihood of picking "nothing in particular," "spiritual but not religious," or "agnostic," might think all of these categories describe their experience in part. By the same formula, $H = -\Sigma(.10\log(.10) + .30\log(.30) + .30\log(.30) + .30\log(.30))$, an even dispersion across three possible categories increases their entropy score nearly eightfold, to $H = .55$. Adding more categories to a categorical identification item *can* help to produce a more accurate classification of respondents *if those categories are clear, distinct, and meaningful to respondents*. Adding additional categories that are equally plausible for respondents can further trouble accurate classification by unreasonably inflating potential measurement error, especially if additional options for religious affiliation are rolled into the same survey question.

disaffiliate from formal religious institutions (Ammerman 2013, 2014; McClure 2017). The inverse is also true; evidence also suggests that some people may be labeled as religious when they are substantively nonreligious, as in the case of people who "belong without believing" (Kasselstrand 2015) or those who navigate conflicting religious and social identities (Wedow et al. 2017).

Together, underreporting, misreporting, and inconsistency in religious experience all raise questions about the stability and the consistency of our most common measure of nonreligious self-identification that I investigate in this study. The research literature has identified a number of conditions that make it possible for more people to report religious non-affiliation that I discuss below. One way to better understand inconsistencies in reporting is to use these mechanisms to make a predictive model and generate plausible estimates of what respondents' religious identifications *might* be. By comparing those estimates to their actual self-identification, and examining where they fall short, we can better understand when a basic self-identification measure is most useful for studying nonreligion and when and how it falls short. To build the best possible model to conduct this test, I consider six major explanatory factors for disaffiliation from the literature.

Core Predictors of No Religious Affiliation

There are many different reasons that people report no religious affiliation. It is important to emphasize that this study does not intend to adjudicate which explanations have the strongest causal effect. Instead, to build the best possible predictive model, it aims to identify the broad range of explanations that make reporting no religious affiliation "more possible for respondents" (Abend 2020). My review of the research literature highlights six major enabling factors: low religious belief, low religious behavior, cohort changes, family and peer

socialization, political views, and other demographic factors indicating one's relative social position.

Low Religious Belief

The most straightforward explanation for religious disaffiliation is that people stop believing in the tenets of their religious tradition – an explanation often given in interview studies (Thiessen and Wilkins-Laflamme 2020; Zuckerman 2011). As with other studies of role exit (Ebaugh 1988), formal de-identification with a religious tradition or other social group is usually the final step in a much longer process of reconciling other changes in beliefs and affinities and socially preparing to transition out of a group. This work makes a plausible case for putting non-affiliation at the end of the theorized causal process and using religious belief items – most often belief in god and biblical literalism – as an independent variable predicting religious non-identification.

Low Religious Behavior

Changes in religious practice lead changes in both religious beliefs and identities. Research shows how practices are often a gateway to formal conversation, because they establish embodied experiences that shape self-understandings in turn (Winchester 2008). Similarly, decreases in service attendance tend to precede formal disaffiliation and uncertainty in religious beliefs (Keysar 2014). As with belief, it is also plausible to place measures of less frequent religious practice–such as less frequent church attendance or prayer–earlier in the theorized causal process as independent predictors as well.

Time: Age & Cohort Change

Most explanations for religious non-affiliation emphasize two kinds of changes in time. The first is a life course perspective, which expects that people will decrease their religious

practices, and potentially disaffiliate, before returning to religious communities during family formation (Margolis 2018). Therefore, the predictive models below include age to account for these individual traits.

However, there have also been larger social changes that disrupt this narrative, leading people in younger birth cohorts to persist in their non-affiliation. These include conditions of political polarization detailed below (Hout and Fischer 2014; Margolis 2018), and the fact that religion is less universally central to family socialization in the United States (Manning 2015). Voas and Chaves (2016) observe stark patterns in cohort-based secularization in the United States, suggesting that studies should also account for birth cohort.

Family & Peer Socialization

In addition to the fact that more people are raising children outside of religious groups (Manning 2015), more people are also growing up with secular peer groups (Thiessen and Wilkins-Laflamme 2017). There are also a growing number of nonreligious advocacy groups in the US providing social support for people without a religious affiliation (Cimino and Smith 2014; Frost 2019; García and Blankholm 2016; LeDrew 2015). These studies demonstrate that familial and peer socialization also create conditions in which non-affiliation is more possible, and they suggest that any model of disaffiliation should account for religion respondents were raised in, at minimum, and information about other social ties if possible.

Political Views

Liberal and progressive political views are a core predictor of religious non-affiliation as a backlash to the religious right (Bock 2021; Hout and Fischer 2002, 2014; Putnam and Campbell 2012). More current work emphasizes political heterogeneity among the unaffiliated, especially when we compare atheists and agnostics to respondents who select “nothing in

particular" (Baker and Smith 2015; Campbell et al. 2021; Schwadel 2020). For the broad comparison of affiliated and unaffiliated respondents, however, we have strong evidence to place political views earlier in the causal pathway to non-affiliation, because life course research emphasizes how these political views tend to develop and solidify in early adulthood before religious commitments are finalized during family formation (Margolis 2018).

Other Demographic Factors

Additional work demonstrates that respondents' social locations shape the plausibility of self-identifying as religiously unaffiliated. These labels are gendered (Edgell et al. 2017) and raced (Baker 2020; Hutchinson 2020), such that women and respondents of color who may ostensibly be more secular in their beliefs or practices may nevertheless be less likely to identify as nonreligious. Education and social class have a more ambiguous relationship with non-affiliation than conventional theories of secularization would expect, because they operate on religious participation as a leading indicator of affiliation or non-affiliation as well (Mayrl and Oeur 2009; Mayrl and Uecker 2011; Uecker, Regnerus, and Vaaler 2007).

The Current Study

This investigation builds on previous research by using a simple machine learning classification approach in addition to conventional regression modeling strategies of most research in the field (James et al. 2013). In this approach, researchers separate out a set of training data for the purposes of fitting a regression model, save those model estimates, and use them to predict outcomes in a second set of test data. Doing so provides a test of the predictive validity of the original model by assessing whether it can properly estimate whether a set of new respondents are likely to belong to a given category or not.

This approach is especially useful to test questions about religious disaffiliation, because a predictive model is theoretically interesting regardless of whether it correctly classifies people. If it does correctly classify respondents, results will be theoretically useful for validating our current explanations of religious disaffiliation and assessing the extent to which the literature has provided a comprehensive set of explanations, or if there is remaining variation to explain. They will also be methodologically useful in providing a proof of concept for the potential imputation of missing values on coarsened religious identification questions (Krenzke and Judkins 2008). If the model does not correctly classify respondents, it is theoretically useful to examine the direction of its errors: does the model accidentally label people as nonreligious when they say they are religious, or vice versa? Knowing the answer to this question will help researchers better evaluate potential biases in their own interpretation of patterns of religious engagement and disengagement. Finally, this approach allows me to estimate the probability that any given respondent will identify as religiously unaffiliated. These estimates allow for models that evaluate selection bias in attitudinal patterns among religiously-unaffiliated respondents (Morgan and Winship 2015). Other studies have shown that selection bias is an important consideration for the study of how life course changes, such as educational attainment, structure changes in attitude later on (Campbell and Horowitz 2016; Wodtke 2018). Research on the unaffiliated is particularly interested in whether they exhibit more progressive political attitudes than other groups (Baker and Smith 2015; Campbell et al. 2021; Schwadel 2020), but we do not yet know whether the status of being unaffiliated or the conditions of selection into non-affiliation drive attitudinal patterns.

Data

I use data from the cumulative General Social Survey cumulative cross-sectional file (1972-2018). The General Social Survey (GSS) is a project of the independent research organization NORC at the University of Chicago, with principal funding from the National Science Foundation (Smith et al. 2018).

Measures

Non-Affiliation & Likelihood of Non-Affiliation

The core measure for this study is a dichotomous indicator for whether respondents report being "none" on the GSS religious identity question: "What is your religious preference? Is it Protestant, Catholic, Jewish, some other religion, or no religion?" After estimating logistic regression models with this outcome in the training data (1988-2014), I use the final model to estimate a second, continuous measure: the predicted probability that each respondent in the test data will identify as "none" based on their responses to all predictor variables ($\hat{p}_{(none)}$).

Respondents may have a high or low likelihood of nonreligion based on model estimates, and values of $\hat{p}_{(none)}$ will not necessarily correspond directly to outcomes on the dichotomous identification measure. This is a benefit of the measurement approach, because it allows me to identify respondents who defy our expectations: those who have a low likelihood but identify as "none" and those who have a high likelihood but identify as affiliated. Using the approach detailed in Morgan and Winship (2015), I create survey weights to emphasize these particular respondents with the Average Treatment Effect (ATE) of non-affiliation conditional on probability of selection into non-affiliation:

$$\text{For } X_{(none=1)}, \text{ ATE} = 1/\hat{p}_{(none)}$$

$$\text{For } X_{(none=0)}, \text{ ATE} = 1/(1-\hat{p}_{(none)})$$

These ATE weights make respondents "count more" in analysis when the actual status of their religious non-affiliation does not match their estimated likelihood of non-affiliation. They yield lower values when respondents who are likely to identify as unaffiliated do so, and higher values when respondents who are unlikely to identify as unaffiliated do so. A similar pattern applies to the affiliated respondents; those with a high estimated likelihood of being unaffiliated who report a religious affiliation receive higher weights as well. By weighting regression models with these ATE weights in the third part of analysis, we can assess the extent to which differences in attitudes are explained by actual nonreligious identification, or the likelihood of identifying as nonreligious based on other explanatory factors.

Low Religious Belief & Behavior

I use two, field standard measures for religious beliefs in the GSS: the 6-point scale for confidence in the existence of god (1- "I don't believe in God"…6-"I know God really exists and I have no doubts about it"), and the 3-point ordinal measure for feelings about the Bible (1-"The Bible is the actual word of God and is to be taken literally, word for word," 2-"The Bible is the inspired word of God but not everything in it should be taken literally, word for word," 3-"The Bible is an ancient book of fables, legends, history, and moral precepts recorded by men"). I also use frequency of religious service attendance (0-"Never" to 8-"More than once a week").

Partisanship and Culture Wars Issue Preferences

This study uses four measures of political views at two stages of analysis. First, the predictive model uses the 7-point scale for political party identification (0-"strong democrat" to 6-"strong republican," with "other", "don't know," and "no answer" dropped from analysis). And the 7-point scale for political views (1-"extremely liberal" to 7-"extremely conservative,"

with “don’t know,” and “no answer” dropped from analysis). I use these measures following the insights of Margolis’ (2018) work, which suggests that general political views develop earlier in the life course than formal religious affiliation.

Second, in analysis examining selection effects, I use two outcome measures of issue preferences that the literature has identified as particularly important for religious disaffiliation: approval for same-sex relationships and pro-choice views. I measure approval for same-sex relationships using the item, “what about sexual relations between two adults of the same sex--do you think it is always wrong, almost always wrong, wrong only sometimes, or not wrong at all?” (1-“Always wrong” to 4-“Not wrong at all”), and I measure strong pro-choice views using the item “Please tell me whether or not you think it should be possible for a pregnant woman to obtain a legal abortion if…. The woman wants it for any reason?” (0-“No”, 1-“Yes”). These are two attitudinal items on which we would expect religiously unaffiliated respondents to have substantively more progressive views than religiously affiliated respondents.

Age, Cohort, and Other Demographics

To measure potential cohort change, I take the birth year variable *cohort* and divide it into deciles, creating 10-year birth cohort ranges like those used by Voas and Chaves (2016). To measure whether respondents report being raised nonreligious (Manning 2015), I recode the GSS item *relig16* into a dichotomous indicator for respondents who reported no religious affiliation for their parents’ religious tradition. Finally, I include a range of relevant demographic predictors from the GSS’s standard measures for age (age), gender (*sex*), race (*race*), highest year of education completed (*educ*), and income (*income*). All continuous measures in these models were mean-standardized, and I used listwise deletion for incomplete cases. This yielded 11,326 complete observations for analysis, which I separated into a training data set (1988-2014 waves,

n= 8,748) and a test data set (2016 and 2018 waves, n=2,578). All measures are summarized in Table One.

Analytic Approach

Analysis proceeds in three parts: model and prediction selection, error description, and selection modeling. First, I present a series of logistic regression models in the training data, demonstrating that the progressive inclusion of each set of explanatory factors substantively improves model fit. I generate predictions for respondents in the test data using multiple thresholds and evaluate the accuracy of these predictions. Second, I examine patterns in model errors and present a descriptive profile of people who were misclassified by the model. Third, using the "culture wars" policy items, I use a regression-adjusted approach to modeling selection (Morgan and Winship 2015) to assess whether the estimated likelihood of nonreligious affiliation or actual nonreligious affiliation has a stronger relationship with policy attitudes.

Results

How Strong are Our Explanations?

Table Two presents a series of logistic regression models for no religious affiliation that progressively test each of the main predictors from the literature in the training data (GSS waves 1988-2014). Religiosity contributes the most to the variance explained by the models. Skepticism about the bible and being raised nonreligious are both positively associated with the likelihood of no affiliation, while stronger belief in god and higher reported attendance at religious services both associate with a lower likelihood of no affiliation ($p<.001$ in all cases). Political views, generational measures, and sociodemographic indicators each explain less of the variation, but all together these explanatory factors yield an improved model fit. The final model containing all

measures yields substantive reductions in the AIC and BIC and improvements in both the McFadden and Nagelkerke pseudo R-squared measures.

I use this final composite model to generate predicated probabilities of no religious affiliation for each respondent in the test data (n=2,578). The next step in analyses is to define a cutoff point at which values on this probability should classify individuals as either affiliated or unaffiliated. Table Three demonstrates this process. The actual proportion of religiously unaffiliated respondents in the test data was twenty-two percent. I set a variety of predicted probability thresholds ranging from .20 to .80, used each of those thresholds as a set of rules to classify respondents, and then compared the estimated proportion unaffiliated to the actual proportion unaffiliated. A cutoff threshold of $\hat{p}_{(\text{none})} = .40$ produced the closest estimated proportion of unaffiliated individuals to the actual proportion, and so I use the binary estimates for no religious affiliation generated with this cutoff for the following models.

Figure One and Table Four compare the model estimates of religious affiliation to actual religious affiliation. Of the whole sample, 87% of respondents in the test data were correctly classified, with 13% of respondents (n=336) misclassified. Overall, this suggests that the dominant explanations for religious non-affiliation in the literature do have a tolerable level of predictive validity. We can examine patterns across those 336 misclassified respondents in detail to understand how these explanations can be improved.

Who Does the Model Misclassify?

Among religiously affiliated respondents, 175 were misclassified as unaffiliated. Among religiously unaffiliated respondents, 161 were misclassified as affiliated. While these errors appear equally distributed, it is important to note that the base rate of each of these groups in the population is different. These errors correspond to 27.8% of unaffiliated respondents

misclassified, versus 8.7% of affiliated respondents. If misclassification were random, we would expect approximately twenty percent of errors to occur in the unaffiliated group, not nearly half. A chi-square test for the cross classification was statistically significant (X^2 = 141.49, p<.001), indicating that the model was significantly more likely to misclassify unaffiliated respondents as affiliated.

Table Five further details these patterns by comparing correctly classified to misclassified respondents on key religious variables. Results from two-tailed t-tests and chi-square tests indicate that misclassified respondents look at a lot like unaffiliated respondents in general. They had, on average, lower average belief in god, lower average church attendance, and a less literatel view of the bible. This suggests that the predictive model is more likely to mis-classify respondents with *low religious engagement* on a variety of measures, that is, it tends to mistake people with low engagement for religiously affiliated when in fact they call themselves unaffiliated. This raises an important question for future research: does attending to the identity label of "no religion," a difference in kind, risk missing effects that are actually due to "low religion" as a difference of magnitude?

Low Religion or No Religion?

Morgan and Winship's regression-weighting approach to modeling selection effects (2015) can help address the question of how best to specify religious disengagement in explanatory models. Tables Six and Seven present results from two sets of analyses using measures known to be key correlates of progressive political views and lower religious engagement: support for same-sex relationships and pro-choice views (Bock 2021; Duggan and Hunter 2006; Hunter 1992; Putnam and Campbell 2012). In Table Six, I present a series of OLS

regression models[2] predicting support for same-sex relationships using the binary measure of unaffiliated, the probability of unaffiliated, and conservative political views. The first three models use standard GSS survey weights, and they show that both measures of nonreligion are positively associated with support for same sex marriage. Low religious engagement measured by the predicted probability, however, has a stronger positive relationship with these views even net of controls for the direct effect of conservative views. More importantly, the positive effect of identifying as unaffiliated disappears in Model Four, which is weighted using the Average Treatment Effects for respondents who are particularly unlikely to be unaffiliated but identify as such. In other words, we can attribute more of the effect on political views to the religious and demographic correlates of *low religion* that encourage people to select into the unaffiliated group than their actual status of *no religion* in self-identification with the unaffiliated group.

Table Seven illustrates a comparable pattern with a different outcome measure. Using a binary measure of support for abortion "in any case," the same results occur when we re-weight a set of logistic regression models using the same ATE weight. Again, the estimated likelihood measure for unaffiliated has a stronger positive relationship with likelihood of support for abortion than the actual status of being unaffiliated. In both of these cases, readers will notice the sign of the relationship for unaffiliated reverses in Models Four and Five. This does not necessarily an effect where unaffiliated respondents are suddenly more conservative than affiliated respondents. Instead, it should be taken as evidence for a null result that suggests extreme volatility in the unaffiliated measure once we account for potential selection effects that condition self-identification as unaffiliated.

Discussion & Conclusion

[2] Ordered logit models, available upon request, produced comparable effects.

Much of the scholarly discussion about rising numbers of people with no religious affiliation has turned to accounts of whether this group is *really* religious. The use of terms such as "unchurched believers" and "spiritual but not religious" respondents (Baker and Smith 2015; Hout and Fischer 2002; McClure 2017) speaks the fact that many unaffiliated people have not necessarily given up any sense of engagement with religious groups or spiritual pursuits of meaning and moral order. This makes sense given the fact that religious engagement is often inconsistent and practiced pragmatically (Ammerman 2020; Chaves 2010). One implication of these efforts, however, is a latent assumption that scholars are too quick to misclassify people as nonreligious when they are in fact religious to some extent.

This paper set out to assess the extent to which this misclassification is baked into our common measures and statistical models for explaining no religious affiliation and, if so, how we can address that problem with existing survey data. Focusing on predictive validity using an approach informed by the logic of machine learning allowed me to examine the nature of these misclassifications and whether they might affect our results through selection bias into the "unaffiliated" category commonly used in survey research. Results from the General Social Survey highlight two important findings for future research on nonreligion and survey research into the nature of religious experiences in general.

First, these results showed that misclassification tends to go both ways. A logistic regression model trained on our core explanations for no religious affiliation goes against the expectations mentioned above; it was more likely to misclassify nonreligious respondents as religious. It is true that unaffiliated respondents only comprise about twenty-two percent of the test data sample, and more rare events are more difficult to classify. The more extreme concentration of errors in the unaffiliated group, however, makes an important theoretical point

for research on nonreligion. Perhaps it is appropriate to consider an "unchurched believer" – an unaffiliated respondent with a higher reported belief in god – as categorically different from other unaffiliated respondents. What, then, should we do with the opposite example of a lapsed Catholic? A person who appears to be quite low in conventional measures of religious engagement may behave more like a religiously unaffiliated respondent, but, because they call themselves a Catholic, they appear as "religious" when using a self-identification measure. The results of the first part of analyses suggest that these kinds of respondents have a substantive impact on the predictive validity of our survey categories, and they raise questions about whether scholars should be most concerned with the effects of "no" religion at all, or the effects of "low" religion among people who may self-identify as affiliated.

Second, these results showed that "low" religion may be the more substantive mechanism at play in our analysis of the social and political implications of religious disaffiliation. Generating the predicted likelihood of no religious affiliation for respondents in the GSS test data allowed me to model potential selection biases in the relationship between nonreligion and progressive social attitudes toward same-sex relationships and abortion. These results showed that the factors that condition selection into the unaffiliated category (such as low belief in god, religious practice, and demographic correlates) have a more stable relationship with progressive social attitudes than the state of self-identifying as unaffiliated itself.

These two points—the sensitivity of measures of religious identity and "low" religion over "no" religion—have important implications for social scientific research on nonreligion and attitude formation. For research on nonreligious respondents, specifically, it suggests that scholars should take great care in the invention of new categories of nonreligious identities, especially categories that would expand the number of options on a self-identification measure

for respondents to pick. The addition of new categories could potentially inflate measurement error, because this analysis shows that even the most simple option of "none" or, in other questions "nothing in particular" is subject to misclassification. One limitation of this study is that the GSS items did not allow for the evaluation of additional identity categories such as atheist, agnostic, and spiritual but not religious. Most of the work on nonreligious identification to date argues that these additional categories can reduce measurement error by providing more options tailored to respondents' experiences, rather than a stark choice between religious and "none" (Thiessen and Wilkins-Laflamme 2020). This is a fair point, but the second part of these results suggests inverse is also possible: the addition of new categories may further complicate the measure, introducing more differences in *kind* that are better measured as differences in *magnitude* across other survey items tapping belief, behavior, or salience. Using a composite approach, such as Baker's (2021) cross-classification scheme with multiple survey measures, is one way to address this problem. Another option is to consider different "cultural repertoires" of nonreligion, or substantively different styles of participating in groups and communities among the unaffiliated (Edgell 2012; Frost 2019), that could be captured with composite indices and pseudo-continuous measures comprised of multiple items in existing survey data.

More generally, a growing body of research is interested in the relationship between religion, nonreligion, and political attitudes (Baker and Smith 2015; Bock 2021; Campbell et al. 2021; Schnabel 2020; Schwadel 2020). Future research building on this work should return to the issue of selection bias (Morgan and Winship 2015; Regnerus and Smith 2005), especially because we know that political views increasingly condition selection into religious groups and identification categories (Margolis 2018). This does not necessarily mean that religion or nonreligion carry *no* explanatory power in the formation of other attitudes, beliefs, or behaviors,

but that research will need to carefully specify the mechanism through which they have any particular empirical effect. Focusing on "low" religion, as this analysis does, is only one potential mechanism. Other work has developed additional measurement constructs as potential mechanisms, such as Christian Nationalism (Whitehead and Perry 2020), other views on religion and the public sphere (Delehanty, Edgell, and Stewart 2019; Stewart, Edgell, and Delehanty 2018), and different accounts of embodied religious practice (Ammerman 2020; Winchester 2008) as different "potential movers" in our explanations of how religion structures social behavior.

Overall, this analysis has shown that our current explanations for religious disaffiliation do have a substantive degree of explanatory power and predictive validity. They also show, however, that it is more difficult to accurately consider religiously unaffiliated Americans as a distinct, tangible constituency the way one would consider Catholics or evangelicals in social analysis. This is because our current categorical measurement strategy not only misses a number of unaffiliated Americans who are substantively religious, as highlighted by earlier work, but also because they miss a number of affiliated Americans who are substantively not religious. By specifying a focus on low religion, rather than no religion at all, we can recover this group and improve the study of this period of religious change in the United States.

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Data

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Table 1: Description of Measures

	Mean/Prop	SD	Min	Max		Mean/Prop	SD	Min	Max
Current Religious Affiliation					**Other Demographic Factors**				
Affiliated	0.83				Race				
Unaffiliated	0.17				*White*	77.2			
Religious Belief/Behavior					*Black*	14.5			
Belief in God	5.10	1.4	1	6	*Other*	8.3			
Biblical Literalism					Gender				
Word of God	0.32				*Male*	45.1			
Inspired Word	0.47				*Female*	54.9			
Book of Fables	0.20				Education (Years)	13.6	3	0	20
Religious Service Attendance	3.50	2.8	0	8	Income	10.8	2.4	1	12
Age/Cohort Change					Married	0.5	0.5	0	1
Birth Cohort Deciles	7	2.6	1	10	Has Children	0.7	0.4	0	1
Age	47	17.2	18	89					
Family Socialization									
Raised Affiliated	0.93								
Raised Unaffiliated	0.07								
Political Views					**Political Outcomes**				
Party Identification (Republican)	2.8	2.1	0	7	Abortion in Any Case	0.4	0.5	0	1
Political Views (Conservative)	4.1	1.4	1	7	Approval of Same-Sex Relationships	2.4	1.4	1	4

Notes: Aggregated GSS Sample, N=11,326

Table 2: Logit Model Estimates for No Religious Affiliation (GSS Training Data)

	Model 1 Religion	Model 2 Politics	Model 3 Age/Cohort	Model 4 Demographics	Model 5 Final Model
Belief in God	-0.71***				-0.71***
	(0.04)				(0.04)
Service Attendance	-1.45***				-1.54***
	(0.07)				(0.07)
Raised Nonreligious	2.19***				2.16***
	(0.12)				(0.13)
Bible Inspired Word	0.07				0.01
	(0.12)				(0.13)
Bible Book of Fables	0.89***				0.82***
	(0.14)				(0.15)
Republican		-0.01			-0.09
		(0.03)			(0.05)
Conservative		-0.58***			-0.17***
		(0.04)			(0.05)
Cohort Decile 2			0.73		0.69
			(0.53)		(0.65)
Cohort Decile 3			0.83		0.95
			(0.52)		(0.65)
Cohort Decile 4			1.53**		1.76**
			(0.50)		(0.63)
Cohort Decile 5			1.97***		2.09***
			(0.50)		(0.63)
Cohort Decile 6			2.13***		2.29***
			(0.50)		(0.63)
Cohort Decile 7			2.40***		2.55***

			(0.50)		(0.64)
Cohort Decile 8			2.44***		2.82***
			(0.51)		(0.65)
Cohort Decile 9			2.93***		3.14***
			(0.52)		(0.66)
Cohort Decile 10			3.57***		3.58***
			(0.53)		(0.67)
Age (Mean Standardized)			0.34***	-0.31***	0.37***
			(0.07)	(0.04)	(0.10)
Black				-0.37***	0.77***
				(0.10)	(0.14)
Other Race				-0.14	-0.25
				(0.11)	(0.14)
Female				-0.51***	-0.28***
				(0.06)	(0.09)
Education				0.20***	0.03
				(0.03)	(0.05)
Income				0.01	0.02
				(0.04)	(0.05)
Married				-0.39***	0.02
				(0.07)	(0.10)
Has Children				-0.30***	-0.1
				(0.08)	(0.10)
(Intercept)	-3.37***	-1.84***	-4.22***	-1.12***	-5.95***
	(0.12)	(0.03)	(0.50)	(0.07)	(0.64)
N	8748	8748	8748	8748	8748
AIC	4280.4	7021.5	7023.8	7028.9	4050.9
BIC	4322.9	7042.8	7101.6	7092.6	4227.8
McFadden R2	0.42	0.05	0.05	0.05	0.46

Nagelkerke R2	0.53	0.07	0.07	0.07	0.56
Log.Lik.	-2134.216	-3507.772	-3500.897	-3505.453	-2000.442

*Notes: GSS 1988-2014 training data. Two-tailed tests. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table 3: Prediction Cutoffs Summary (GSS Test Data)

Actual Percent Unaffiliated:		0.22	
p̂(none) Threshold	Error in % Unaffiliated	p̂(none) Threshold	Error in % Unaffiliated
.20	0.10	.50	-0.02
.30	0.04	.60	-0.05
.40	**0.005**	.70	-0.09
.45	-0.010	.80	-0.13

Notes: GSS 2016-2018 Test Data. N = 2,578, preferred cutoff in bold at p(none) = .40 produces the closest estimate to actual percent unaffiliated in the sample.

Table 4: Classification Summary in Test Data

Respondents self-identified as…	**Model classification was…**	**n**	**% Sample**	**% Subgroup**
Affiliated	Correct	1823	0.71	0.91
Affiliated	Incorrect	175	0.07	0.09
Unaffiliated	Correct	419	0.16	0.72
Unaffiliated	Incorrect	161	0.06	0.28

Figure 1.

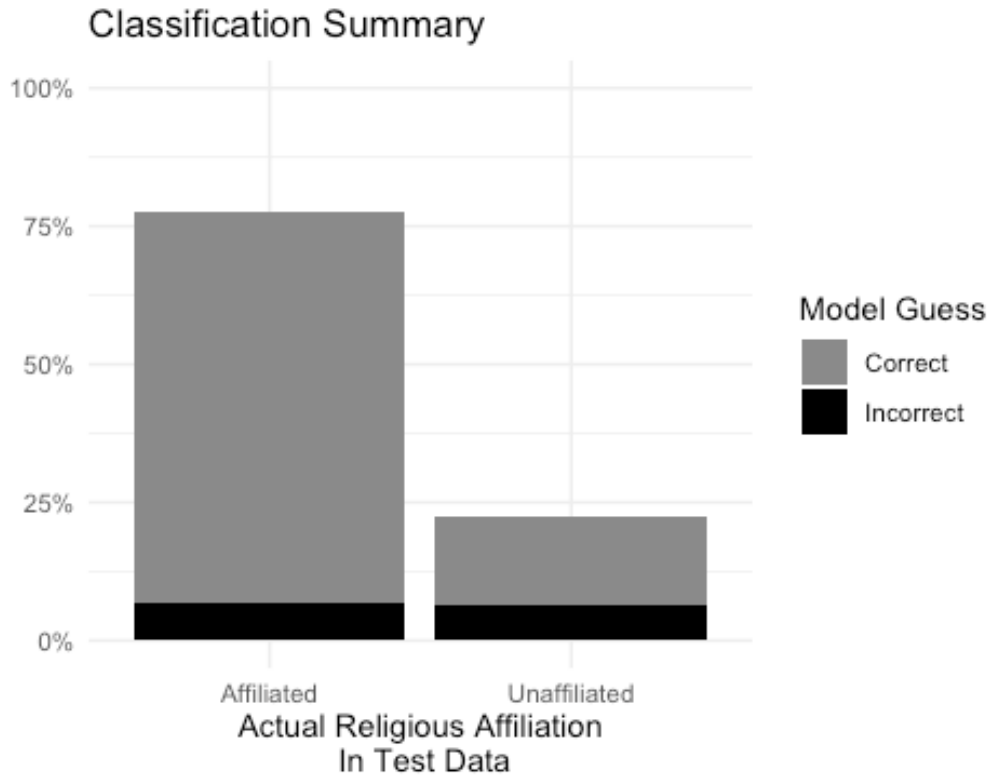
Classification Summary
100%
75%
50%
25%
0%
Affiliated
Unaffiliated
Actual Religious Affiliation
In Test Data
Model Guess
Correct
Incorrect

Table 5: Religion Summary of Misclassified Cases

	Correct (N=2242)	Incorrect (N=336)	
	Mean/Prop	**Mean/Prop**	**Sig.**
Belief in God	5.00	4.21	***
Service Attendance	3.64	1.24	***
Unaffiliated	0.19	0.48	***
Raised Nonreligious	0.08	0.14	***
Bible Views			
Word of God	0.35	0.15	***
Inspired	0.45	0.47	
Book of Fables	0.20	0.39	

*Notes: Mean comparisons use two-tailed t-tests, categorical comparisons use chi-squared test, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table 6: Selection Effects - Same Sex Relationship Approval

	Model 1	Model 2	Model 3	Model 4	Model 5
	OLS - No Religion	OLS - No Religion & Politics	OLS - No Religion, Low Religion	OLS - ATE Weighted	OLS - ATE & Survey Weighted
Unaffiliated	0.999***	0.774***	0.796***	-0.050	-0.375***
	(0.063)	(0.062)	(0.121)	(0.064)	(0.066)
Likelihood of Unaffiliated			1.774***	1.258***	1.303***
			(0.151)	(0.124)	(0.130)
Conservative		-0.270***	-0.211***	-0.187***	-0.150***
		(0.018)	(0.018)	(0.020)	(0.022)
Unaffiliated x Likelihood			-1.392***	0.464**	0.989***
			(0.225)	(0.174)	(0.180)
Constant	2.548***	3.688***	3.234***	3.189***	3.032***
	(0.030)	(0.081)	(0.087)	(0.101)	(0.111)
Observations	2,578	2,578	2,578	2,578	2,578
R2	0.088	0.163	0.206	0.170	0.202
Adjusted R2	0.088	0.162	0.205	0.169	0.200
Residual Std. Error	1.333 (df = 2576)	1.277 (df = 2575)	1.244 (df = 2573)	2.040 (df = 2573)	2.172 (df = 2573)
F Statistic	249.992*** (df = 1; 2576)	250.859*** (df = 2; 2575)	167.295*** (df = 4; 2573)	131.564*** (df = 4; 2573)	162.420*** (df = 4; 2573)

*Notes: GSS 2016-2018 Test Data. Two-tailed tests. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table 7: Selection Effects - Support Abortion in Any Case

	Model 1	Model 2	Model 3	Model 4	Model 5
	Logit - No Religion	Logit - No Religion & Politics	Logit - No Religion, Low Religion	Logit - ATE Weighted	Logit - ATE & Survey Weighted
Unaffiliated	1.308***	1.030***	0.440*	-0.465***	-1.104***
	(0.103)	(0.109)	(0.209)	(0.071)	(0.073)
Likelihood of Unaffiliated			2.411***	2.700***	2.701***
			(0.298)	(0.175)	(0.169)
Conservative		-0.511***	-0.440***	-0.465***	-0.471***
		(0.033)	(0.035)	(0.024)	(0.027)
Unaffiliated x Likelihood			-0.838	0.379	1.922***
			(0.436)	(0.243)	(0.256)
Constant	-0.380***	1.737***	1.169***	1.295***	1.264***
	(0.046)	(0.145)	(0.158)	(0.114)	(0.124)
McFadden R2	0.005	0.13	0.16	0.19	0.26
Nagelkerke R2	0.009	0.21	0.25	0.49	0.63
Observations	2,578	2,578	2,578	2,578	2,578
Log Likelihood	-1,603.793	-1,473.752	-1,429.731	-3,429.589	-3,497.256
Akaike Inf. Crit.	3,211.586	2,953.504	2,869.463	6,869.178	7,004.511

*Notes: GSS 2016-2018 Test Data. Two-tailed tests. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*