Appendix I

# Model by Rozenas

In this section, we describe our implementation of the model proposed by Rozenas (2013). The main difference to our model is that it estimates party platforms and ambiguity on the basis of a single issue dimension, instead of multiple scales. The innovation of the model by Rozenas is that it infers ambiguity from two sources, the variation of party placements on single issues and the missing values on the same scale.

The placement of party  by respondent , , in the issue category  follows an ordered probit specification. For this we define  cutoffs, where  and  and a latent party perception . In addition, the model incorporates information about the missing values . Two sets of parameters influence the placements and non-responses – party-specific parameters, the party platform  and the ambiguity of the platform , and respondent-specific parameters that allow for different perceptions of the scale with a different mid-point  and respondent variances of placements .  and  capture the joint effect of those on the probability of a non-response.

 (7)

 (8)

 (9)

We implement the model in Stan[[1]](#footnote-1) to obtain estimates for the party ambiguity from an eleven-point left-right scale in the Chapel Hill Expert Surveys 2006, 2010 and 2014. We identify the scale of the latent party positions and the respondent parameters similar to Rozenas. We fix the  cut-off points to range from −1 to 1 in equal step-sizes. Priors with fixed hyper-parameters identify the location and spread of the scale. We choose standard normal priors on the platforms . Moreover, we use independent standard normal distributions for the ambiguity parameters  truncated at zero, standard log-normal distributions for the unconstrained , and standard normal priors for the . For the parameters of the missing values we employ standard normal priors, but constrain the effect parameter  to be positive. The model is estimated for each election in our sample seperately, running four chains for 2,000 iterations and discarding 1,500 iterations as burn-in. We inspect the R-hat values for convergence, which all fall below 1.1.

A comparison of the resulting ambiguity estimates to our estimates is discussed in the main text. In general, the Rozenas estimates correlate highly with the standard deviation and the agreement scores on the left-right scale, which suggests that, at least in this application, the placement variability is the main source of variation of the ambiguity estimates in the Rozenas model.

Appendix II

# Extensions of the statistical model

## Missing Values

It is possible to extend the model to explicitly incorporate missing issue placements as a source of ambiguity similar to Appendix I. Define missing placements on issue  for party  by observer  as  and non-missing values as . A simple model for default values as a function of the ambiguity term  can be written as:

 (10)

where  and  are item-specific parameters that capture the relationship between ambiguity and the probability that an observer does not place a party on a particular item. Using appropriate prior distributions, this model can be jointly estimated with the placement model.

## Observer-Specific Deviations From the Item Parameters

Observers might have different perceptions of the latent space, potentially causing disagreement in parties’ issue placements. This would increase the standard deviations, which might affect the ambiguity estimates. Similiar to Appendix I, a Aldrich-McKelvey model can be integrated to partially address the different item functioning. In this model variant, the difficulty and discrimination parameters are observer-specific:

 (11)

To identify the observer-specific item parameters, several assumptions have to be made. It could be assumed that the observer-specific item parameters deviate using an additive or multiplicative process. For example, the difficulty parameters can be defined as the sum of the item-parameters and observer-specific deviations  and the discrimination parameters as their product . This allows for an observer-specific interpretation of the issue scales. Variation in the difficulty parameters allow different observers to perceive a different center by placing all parties more to the right or more to the left on all issues. In addition, variation in the discrimination parameters permits for varying spread of placements on the issues. This would allow some respondents to employ the full range of the issue scales while others only use a smaller range to express their party perceptions.

## Multiple Latent Dimensions

The statistical model can be extended to include  latent dimensions. For this extension, both  and the item-specific discrimination parameter  are defined as vectors in  that enter the latent issue position as follows:

 (12)

The observable mechanism remains unchanged; the extensions described above can be combined with this one.

1. Carpenter et al. (2017) [↑](#footnote-ref-1)