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The Heritability of Foreign Policy Preferences

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Attitudes towards foreign policy have typically been explained by ideological and demographic factors. We approach this study from a different perspective and examine the extent to which foreign policy preferences correspond to genetic variation. Using data from the Minnesota Twin Family Study, we show that a moderate share of individual differences in the degree to which one's foreign policy preferences are hawkish or dovish can be attributed to genetic variation. We also show, based on a bivariate twin model, that foreign policy preferences share a common genetic source of variation with political ideology. This result presents the possibility that ideology may be the causal pathway through which genes affect foreign policy preferences.

■ **Keywords:** foreign policy preferences, ACE, bivariate, Cholesky

We examine two related questions: (a) are individual differences in foreign policy preferences attributable, at least in part, to genetic variation and if so, (b) do political ideology and attitudes towards foreign policy share a common genetic etiology? Existing studies have focused either on the heritability of individual political attitudes related to specific foreign policies and preferences, or the extent to which foreign policy preferences are predicted by political attitudes. We extend these two lines of research by addressing whether a general hawkish or dovish preference is heritable and whether the same genes that account for individual differences in foreign policy preferences are shared with political ideology. Understanding the heritability of foreign policy preferences and their genetic commonalities with ideology is a critical precursor to establishing and testing theories about the causal processes, both direct and indirect, that affect preferences over foreign policy.

The foreign policy preferences of the mass public have traditionally been studied in association with political attitudes: principally party identification and political ideology, but also demographic characteristics such as gender, education, and generation (Holsti, 2004). The literature on foreign policy preferences can be characterized by a relatively stable set of findings on the relationship between demographics and preferences, and a debate over whether party or ideology is the primary determinant of nondemographic variance in foreign policy preferences. Consider first, the stable demographic effects. Perhaps the most consistent finding in this literature is that men are substantially more likely to approve of the use of force abroad than women (Berinsky, 2009; Eichenberg, 2003; Nincic & Nincic, 2002). Though based almost exclusively on the analysis of opinion within the United States, this finding has been replicated in analyses of support for World War II (Berinsky, 2009), the Korean War (Modigliani, 1972; Mueller, 1973), the Vietnam War (Mueller, 1973; Verba et al., 1967), the Gulf War (Conover & Sapiro, 1993), and the wars in Afghanistan and Iraq (Berinsky, 2009). There is also reason to think that, because attitudes towards foreign policy are likely linked to world events that occur proximate to the formation of preferences, there may be generational effects in foreign policy preferences (Holmes, 1985; Holsti, 2004; Klingberg, 1952, 1983). Lastly, there is evidence to suggest that higher levels of education are associated with greater support for internationalism generally and cooperative foreign policies specifically (Holsti, 2004; Wittkopf, 1990, 1995). Interestingly, race effects have been difficult to parse out

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because race covaries strongly with socioeconomic status, education, party, and ideology (Holsti, 2004; Nincic & Nincic, 2002).

Existing knowledge on the nondemographic predictors of foreign policy preferences is considerably more varied. Although there is evidence to suggest that attitudes towards specific foreign policies, particularly armed conflicts, are affected by events (Larson, 1996) and costs (Gartner & Segura, 1998; Gartner & Segura, 2000), a consensus has emerged in the literature that individuals have reasonably well-specified attitudes towards foreign policy in general (Berinsky, 2009; Feaver & Gelpi, 2004; Gelpi, Feaver, & Reifler, 2005; Holsti, 1992, 2004; Hurwitz & Peffley, 1987; Jentleson, 1992; Nincic, 1988; Page & Shapiro, 1992). This suggests that the study of foreign policy attitudes that are not linked to particular issues may be more fruitful than studying approval of particular policies, because these more general attitudes underlie approval for specific policies and are then moderated by the particulars associated with those policies.

When considering the general foreign policy attitudes of citizens, the two respondent characteristics that consistently garner the most attention are party identification and (self-reported) political ideology. The literature examining parties' (correlational) association with foreign policy preferences indicates, if anything, that the degree of association varies greatly over time: policy attitudes up to (and mostly including) the Vietnam era were marked by a lack of partisan cleavage that became highly polarized during the Reagan years and then seems to have relaxed again (Holsti, 2004). The literature on the effect of ideology is more consistent. Wittkopf (1990, 1995) finds that liberals have a greater tendency to support cooperative foreign policies and oppose military internationalism. Conversely, conservatives tend to support military internationalism and oppose cooperative internationalism. Furthermore, evidence from multiple surveys seems to indicate that the effects of ideology dominate those of partisanship (Holsti, 1992, 2004; Wittkopf, 1990, 1995).

Though the finding that political ideology drives foreign policy preferences is based on correlational rather than causal studies, a causal link exists in theory because voters are likely to support the party most in line with their ideology (Downs, 1957). Both ideology and partisanship are believed to be transmitted to children from their parents at an early age (Campbell, Converse, Miller, & Stokes, 1960). As such, it is difficult for empirical studies based on surveys to parse out the two effects. This, in turn, begs the question of where ideologies come from. Martin et al. (1986) demonstrated that genetic variation accounts for a moderate share of individual differences in political attitudes and overall liberalism–conservatism. Numerous studies using a variety of methods, including twins reared apart and extended kinships, confirmed and expanded upon these earlier findings (Alford, Funk, & Hibbing, 2005; Bouchard, Lykken, McGue, Segal, & Tellegen, 1990; Eaves, Eysenck, & Martin, 1989; Eaves et al., 1999; Hatemi et al., 2010; Lykken, Bouchard, McGue, & Tellegen, 1990). Recent studies have also demonstrated that environmental factors such as the important life events individuals experience (Hatemi, 2010) and the characteristics of one's social network (Settle, Dawes, Christakis, & Fowler, 2010) interact with genetic endowments to shape political attitudes. One study have also argued that genetics can play a role in individual tendencies to commit acts of political violence (Hatemi & McDermott, 2011).

The studies considered above suggest that political ideology is heritable and that there is a significant phenotypic association between ideology and foreign policy preferences. However, no studies have yet addressed the possibility that general foreign policy attitudes are themselves heritable, or whether shared genetic factors underlie the correlation between ideology and foreign policy preferences. Exploring these associations can lay the foundation for theoretical and empirical work on the causal mechanisms and pathways by which genes explain both attitudes and how the attitudes affect each other. Our hypotheses are twofold. First, we hypothesize that, for both foreign policy preferences and political ideology, familial aggregation is best explained by genes and environmental factors. Second, we hypothesize that the observed phenotypic association between the two variables is therefore best explained by a combination of shared genes and environmental factors. Given the correlational nature of the existing literature and of our hypotheses, a correlated liability model is a natural choice: we apply a bivariate ACE model with a Cholesky decomposition to test the extent to which the observed covariance between phenotypes (foreign policy preferences and ideology) can be explained by correlated (genetic and environmental) liabilities. Alternative modeling approaches, such as an ideology mediation model (Baron & Kenny, 1986) or a direction of causation model (Duffy & Martin, 1994; Verhulst et al., 2011), are possible, but existing results do not provide a sufficiently strong theoretical basis for applying such models. The only alternative model we examine is a sex limitation model, which we consider because of the strong sex-based differences survey research has found with respect to foreign policy preferences.

Methods and Results

Sample

Our analysis is based on a sample of 1,192 twins in complete matched pairs. To avoid potential response bias, we restrict the sample to complete twin pairs, though quartile comparison and *t*-tests suggest there are no statistically significant differences between complete and incomplete twin pairs. The original sample, which included matched and unmatched twins, consisted of 1,349 subjects. For our

final sample, which we use for all analyses, we restricted ourselves to the 551 complete twin pairs that answered all questions of interest to us (described below). This group consists of 201 female monozygotic (MZ), 130 male MZ, 80 male DZ, and 140 female dizygotic (DZ) pairs. All twins are members of the Minnesota Twin Family Registry (Krueger & Johnson, 2002; Lykken et al., 1990) and the data we use were generated by a single wave online survey on political attitudes conducted in 2008 and 2009; the ascertainment rate was 61%. A small number of subjects, 240 in total, with limited internet access took the survey on paper. Quartile comparison and *t*-tests suggest there are no significant differences between the subjects who took the survey online and those who did not, with the exception of small but noticeable differences on the dove–hawk question discussed below. All twins surveyed were middle aged, between 53 and 61. There are certain benefits, however, to this restricted age range. First, there is reason to believe that preferences and attitudes become more stable later in life (Krosnick & Alwin, 1989). Second, as mentioned above, a substantial literature indicates that there are likely to be generational effects on foreign policy attitudes (Holmes, 1985; Holsti, 2004; Klingberg, 1952, 1983), and the restriction of this sample to a single generation eliminates our need to control for this factor. For more details on the sample, see the sample description in Smith et al. (2012).

Measures

We rely principally on three measures for our analysis: two measures of foreign policy preferences and one measure of political ideology. We use these different measures because foreign policy preferences are difficult to measure and several analyses with measures that capture somewhat different attitudes will provide us with a better understanding of the robustness of effects under study. Although additional measures of foreign policy preferences and political ideology would be ideal, the only valid measures contained in the data are those we use.

Our first measure of foreign policy preferences captures how dovish (conciliatory) or hawkish (aggressive) a respondent self-reports their attitude towards foreign policy to be. This measure is designed to capture preferences for conciliatory or militaristic internationalism. The preference is coded on a seven-point scale that is a response to the following question: "Some people believe that the United States should solve international problems by using diplomacy and other forms of international pressure and use military force only if absolutely necessary (Position 0). Others believe diplomacy and pressure often fail and the U.S. must be ready to use military force (Position 6). Where would you place yourself on this scale?" As can be seen in Table 1, the mean is slightly higher among MZ twins (2.103) than among DZ twins (1.890), with similar standard errors.

TABLE 1

Summary Statistics for Foreign Policy Preference and Ideology Measures

	MZ Mean	MZ SD	DZ Mean	DZ SD
Dove–Hawk	2.103	1.890	1.925	1.851
Military spending	0.801	0.756	0.836	0.776
Ideology	3.272	1.453	3.300	1.467

Note: SD = standard deviation. The sample is comprised of 331 monozygotic (MZ) and 200 dizygotic (DZ) complete twin pairs.

Our secondary measure of foreign policy attitudes is a three-category reaction (*agree*, *uncertain*, or *disagree*) to the statement that spending for the U.S. military should be increased. This measure is related to the dove–hawk measure (r = .454), but should also capture a somewhat different effect. Because military spending does not necessarily translate into a foreign policy based on military internationalism, it is possible that some subjects may prefer a strong defensive posture (and thus high levels of military spending) and an isolationist foreign policy. As such, we expect results based on this outcome variable to complement the dove–hawk measure (which captures cooperative and militaristic preferences more directly), without being redundant.

Our measure of ideology is a seven-point scale of self-reported political views (*extremely liberal*, *liberal*, *slightly liberal*, *moderate/middle of the road*, *slightly conservative*, *conservative*, *extremely conservative*). As can be seen in Table 2, this measure is positively and significantly correlated with the dove–hawk measure of foreign policy preferences for both MZ and DZ twins, but the cross-twin, cross-trait correlations are higher for MZ twins (r = .385 and r = .323) than for DZ twins (r = .114 and r = .131). This indicates that, as ideology becomes more conservative, foreign policy preferences become more hawkish. Ideology also correlates strongly with the military spending measure and the correlations are higher for MZ (r =0.333 and 0.253) than for DZ twins (.180 and .173). The correlation indicates that, as ideology becomes more conservative, subjects agree more with increases in military spending.

Univariate ACE Model

The first question our analysis must address is whether or not there is evidence to suggest that foreign policy preferences are heritable. We use a univariate ACE model to partition the variance components in each measure into those attributable to additive genetic effects (A), common environmental effects (C), and unique environmental effects (E). All estimation was performed via maximum likelihood in Mx (Neale, Boker, Xie, & Maes, 2003). Details on the statistical procedure can be found in Neale and Cardon (1992) and Medland and Hatemi (2009). Because all of our variables are ordinal, we estimate a

TABLE 2

Phenotypic Correlations (Polychoric) and Cross-Twin Cross-Trait Correlations (Polychoric) between Foreign Policy Preferences Measures and Ideology

	Dove–Hawk	Military spending	Ideology
Phenotypic (N = 551)			
Dove–Hawk	1		
Military spending	0.454	1	
Ideology	0.453	0.424	1
Twin 1			
MZ twin (N = 331)			
Dove–Hawk	0.355	0.354	0.385
Military spending	0.263	0.427	0.333
Ideology	0.323	0.253	0.559
Twin 2			
DZ twin (N = 220)			
Dove–Hawk	0.141	0.137	0.114
Military spending	0.199	0.256	0.180
Ideology	0.131	0.173	0.290

Note: MZ = monozygotic; DZ = dizygotic. Italicized correlations are not significantly different from 0 at p < .05; all other correlations are significant at $p < .05$.

threshold model. In order to test whether the estimated variance components are statistically different for males and females, we estimate a sex-limitation model and compare the model fit to a pooled model in which the variance components are constrained to be equal for males and females. We allow men and women to have different thresholds in both the pooled and sex limitation models. The fit statistics, reported in Table 3, suggest that the pooled model is more appropriate in all cases.

The results, displayed in Table 4, show that the dove–hawk measure of foreign policy preferences has a moderate, but statistically significant, additive genetic component. We also see that this measure does not appear to have a significant common environmental component, but does have a large unique environmental component. Military spending, on the other hand, has an additive genetic effect similar in magnitude to that of the dove–hawk measure, but it is not statistically significant. The only statistically significant variance component of military spending is unique environment. These results offer mixed support for our hypothesis: foreign policy preferences as measured by the dove–hawk continuum — the measure closest to the theoretical construct of interest — are significantly heritable, although we cannot reject the null hypothesis of no heritability for support for military spending. The lack of significant heritability for military spending may be due to its comparatively coarser metric and the small sample of twins surveyed. Nonetheless, because the null hypothesis cannot be rejected for support for military spending, we discontinue its examination.

TABLE 3

Fit Comparison of Alternative Specifications for Univariate Models for Dove–Hawk, Military Spending, and Ideology

	–2LL	Δ–2LL	*p* (df)
ACE	3,955.680		
Sex limitation ACE Dove–Hawk	3,955.951	0.271	0.965 (3)
ACE Military spending	2,293.750		
Sex limitation ACE Military spending	2,295.826	2.076	0.557 (3)
ACE Ideology	3,604.135		
Sex limitation ACE Ideology	3,604.813	0.678	0.878 (3)

Note: –2LL = –2.log-likelihood; Δ–2LL = difference in the –2 log-likelihood; df = degrees of freedom.

Although we know of no behavioral genetic studies of general foreign policy attitudes, Eaves et al. (1999) analyzed attitudes towards the military. Eaves et al. (1999) constructed an index based on five items from the Wilson-Patterson battery (Wilson & Patterson, 1968). The inventory presents short phrases like *death penalty* and asks whether subjects *agree*, *disagree*, or are *uncertain* with the phrase. Their index was comprised of responses to death penalty, military drill, the draft, pacifism, and nuclear power. The authors found that 11% of the variation in these attitudes among males could be attributed to additive genetic factors, compared with 4% among females. Hatemi et al. (2010) reported higher heritability estimates for the two items that are clearly associated with the military, namely military drill (0.32 males and 0.41 females) and the draft (0.30 males and 0.38 females). Our heritability estimate for the dove–hawk measure of foreign policy preferences is similar to the two key military attitudes studied by Hatemi et al. (2010).

Our results for the seven-point scale of self-reported political views are slightly higher than some previously reported estimates for measures of political ideology. For example, Truett, Eaves, Meyer, Heath, & Martin (1992) and Alford et al. (2005) reported that approximately one-third of the variation in political ideology could be attributed to additive genetic factors. Eaves et al. (1999) reported a higher heritability estimate for men (0.36) than for women (0.20), a finding confirmed by Hatemi et al. (2010) (0.58 versus 0.34). With the exception of the heritability for females reported by Eaves et al. (1999), all of the point estimates for the heritability of political ideology lie within the 95% confidence interval for our estimate.

It is also important to note that care is required when comparing our results to previous work. Our study relies on a different sample, both in terms of time and location, as well as different measures of ideology and foreign policy preferences.

Bivariate ACE Model

We now consider the hypothesis that the correlation between foreign policy preferences and political ideology can be explained through correlated genetic liabilities. We examine this possibility by performing a bivariate ACE model with a Cholesky decomposition. This model partitions the covariance between our ideology measure and our dove–hawk measure of foreign policy preferences, respectively, into additive genetic (A), common environmental (C), and unique environmental (E) components.

TABLE 4

Univariate ACE Models

	A	C	E
Dove–Hawk	0.34	0.00	0.66
	[0.11, 0.44]	[0.00, 0.19]	[0.56, 0.76]
Military spending	0.37	0.07	0.57
	[0.00, 0.54]	[0.00, 0.38]	[0.46, 0.69]
Ideology	0.56	0.00	0.44
	[0.27, 0.63]	[0.00, 0.25]	[0.37, 0.53]

Note: 95% confidence intervals for estimates of variance components for additive genetic effects (A), common environmental effects (C), and unique environmental effects (E) are shown below the estimate values.

TABLE 5

Fit Comparison of Alternative Specifications for Bivariate Models for Ideology and Dove–Hawk

	–2LL	Δ–2LL	*p* (df)
ACE Ideology	7,386.311		
Sex limitation ACE Ideology	7,389.051	2.741	0.974 (9)
ACE Ideology rc = 0	7,389.066	0.015	0.903 (1)

Note: –2LL = –2.log-likelihood; _–2LL = difference in the –2log-likelihood; df = degrees of freedom.

In other words, it allows us to quantify the degree to which the same genes underlie both ideology and foreign policy preferences. As in the univariate case, we estimate both the sex limitation and pooled models and compare model fit. In the sex limitation Cholesky model, separate standardized path coefficients are estimated for both males and females, and in the pooled model the path coefficients are constrained to be equal across sex. In addition, because the common environmental variance component was not significant in the univariate model for the two measures we are studying as part of the bivariate analysis, we estimated a model constraining the common environmental correlation in the pooled model to zero (an ACE $r_c = 0$ model). The fit statistics associated with these models are displayed in Table 5. Because both the full model and the one in which $r_c = 0$ fit better than the sex limitation models, we do not display the sex limitation model results.

The results for the full model shown in Table 6 are consistent with the idea that ideology and foreign policy preferences share the same genetic influence. The genetic correlation between the dove–hawk measure and self-reported ideology is .82, 95% CI [.56, 1.00]. The unshared environmental correlation is .23 95% CI [.11, .34]. The shared environmental correlation is not significantly different from zero. The covariance between ideology and foreign policy preferences can be primarily explained by additive genetic factors: 76% of the covariance between self-reported ideology and foreign policy preferences can be attributed to additive genetic factors. The results for the model in which the shared environmental correlation is constrained to be zero are very similar and the resulting substantive conclusions are identical.

Discussion

This study has produced two findings. First, we have shown that foreign policy preferences, as measured by a dove–hawk continuum, are heritable. Second, we found that the correlation between political ideology and foreign policy preferences appear to be explained largely by the same set of genes. In other words, the genes that influence ideology may also explain foreign policy preferences.

The idea that general foreign policy preferences are heritable is novel to the study of said preferences. Attention in analyses of the determinants of foreign policy preferences has typically been focused on political attitudes such as partisanship and ideology, and respondent characteristics such as sex, race, education, generation, and geographical location. This study contributes to a growing literature that suggests many social, behavioral, and political attitudes are influenced by

TABLE 6

Bivariate ACE and ACE $r_c = 0$ Estimates of Variance and Covariance Components for Ideology and Dove–Hawk

	ACE Ideology model			ACE $r_c = 0$ Ideology model		
	V_A	V_C	V_E	V_A	V_C	V_E
Ideology	0.54 [0.26, 0.65]	0.03 [0.00, 0.28]	0.43 [0.35, 0.51]	0.54 [0.30, 0.65]	0.04 [0.00, 0.24]	0.42 [0.35, 0.51]
Dove–Hawk	0.35 [0.10, 0.44]	0.00 [0.00, 0.21]	0.65 [0.56, 0.76]	0.35 [0.15, 0.44]	0.00 [0.00, 0.17]	0.65 [0.56, 0.76]
	Cov_A	Cov_C	Cov_E	Cov_A		Cov_E
Ideology–Dove-Hawk	0.76 [0.35, 0.96]	–0.01 [–0.15, 0.34]	0.25 [0.12, 0.40]	0.74 [0.60, 0.87]		0.26 [0.13, 0.40]
	r_g	r_c	r_e	r_g		r_e
Ideology–Dove-Hawk	.82 [0.56, 1.00]	–1.00 [–1.00, 1.00]	.23 [0.11, 0.34]	.80 [0.63, 1.00]		.23 [0.11, 0.34]

Note: V_A, V_C, V_E = percent of variance [95% confidence interval] explained by additive genetic effects (heritability), common environment, and unique environment, respectively; Cov_A, Cov_C, Cov_E = covariances [95% confidence interval] between Ideology and Dove–Hawk explained by additive genetic effects, common environment, and unique environment, respectively; r_g, r_c, r_e = [95% confidence interval] genetic correlation, common environmental correlation, and unique environmental correlation, respectively.

genetic differences. Yet the finding that foreign policy preferences are heritable tells only part of the story.

The robust finding in the literature that ideology has a moderate association with individuals' foreign policy preferences (Holsti, 1992, 2004; Wittkopf, 1990, 1995), coupled with the strong correlations between our measures of these two attitudes, suggest the same set of genes may explain both variables. In other words, the phenotypic correlation between ideology and foreign policy preferences may be explained by correlated genetic liabilities. This finding lays the groundwork for a more detailed causal understanding of these phenomena. Combining the intuition that liberal individuals are likely to prefer cooperative foreign policies and that conservative individuals are likely to prefer militaristic foreign policies with the results of the univariate ACE model, which suggests that political ideology is also heritable, signals that ideology may be the causal pathway through which genes influence foreign policy attitudes. The results from our bivariate ACE analysis are consistent with the claim that ideology mediates this relationship. However, it is important to point out that the Cholesky model is not a mediation model and does not establish a causal relationship. Genetic correlations may be interpreted as genes influencing one trait that then influences a second trait. Alternatively, genes may be influencing both traits in a pleiotropic manner (Posthuma et al., 2003). For example, it may be the case that genes are influencing ideology, which in turn influences foreign policy preferences. However, it may also be the case that these genes are influencing ideology and foreign policy preferences independently. We have not aimed to test these possibilities here, but leave such work for future research.

Our analysis does not indicate, however, that genetics are the primary factor driving either foreign policy preferences or ideology: variance in both measures of both attitudes are generally dominated by unique environmental factors, which account for more than half of the variance in all attitudes under consideration. What our analysis does suggest is that genetic differences are an important factor that should be considered alongside the more traditional predictors of foreign policy preferences.

Further, it is interesting that common environmental factors are rarely a significant part of the picture. Neither of the outcome measures nor the ideology measure has a statistically significant effect for common environment. This is likely attributable to low demographic variance in the sample: all twins were of a similar age from a similar part of the country. A more diverse sample may produce significant effects for common environmental factors.

This study contributes to the synthesis of two approaches that have, until recently, remained distinct. A growing body of research has been suggesting that a wide variety of political and social attitudes and behaviors are heritable. Recent findings have demonstrated heritable variation in political ideology and several foreign-policy-related attitudes (Alford et al., 2005; Eaves et al., 1999; Hatemi et al., 2010; Truett et al., 1992). We have linked these findings to the well-established finding that political ideology is a major predictor of foreign policy preferences. In so doing, we can suggest a more intricate causal story for the realization of individual attitudes towards foreign policy: ideology predicts foreign policy preferences, but a moderate share of individual differences in both foreign policy preferences and ideology can be explained by genetic variation. Furthermore, our analysis suggests that a majority of the genetic variance that accounts for individual differences in ideology is shared with the genetic variance that accounts for individual differences in foreign policy preferences. The conclusions we draw from this set of results are that (a) there are indeed genetic influences that account for varying preferences in cooperative or militaristic foreign policies, and (b) the same genetic influence operates on ideology and foreign policy preferences. These results raise the possibility that ideology is a mediating factor between genetic factors and foreign policy preferences, a possibility that future research using models tailored to establish mediation and direction of causation effects may examine.

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