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Disentangling the Importance of Psychological Predispositions and Social Constructions in the Organization of American Political Ideology

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Abstract

Ideological preferences within the American electorate are contingent on both the environmental conditions that provide the content of the contemporary political debate and internal predispositions that motivate people to hold liberal or conservative policy preferences. In this article we apply Jost, Federico, and Napier's (2009) top-down/bottom-up theory of political attitude formation to a genetically informative population sample. In doing so, we further develop the theory by operationalizing the top-down pathway to be a function of the social environment and the bottom-up pathway as a latent set of genetic factors. By merging insights from psychology, behavioral genetics, and political science, we find strong support for the top-down/bottom-up framework that segregates the two independent pathways in the formation of political attitudes and identifies a different pattern of relationships between political attitudes at each level of analysis.

People endorse political attitudes for multiple reasons. On the one hand, familial, contextual, and elite discourse influences the information people learn, which in turn shapes the attitudes they profess and the policies they endorse. On the other hand, innate predispositions contribute to the attitudes people hold and propel some people to either endorse liberal or conservative positions. Such dispositions subsequently alter the environment an individual selects into and cause individuals to differentially perceive similar environments. This culminates in a broad range of attitudinal variance at the aggregate level. Disentangling which attitudinal precursors are primarily of a function of environmental contexts and which factors are predominantly a function of internal predispositions will allow for a better understanding of the basic processes that drive political behavior at both the sociological and psychological levels.

Few theoretical models of political behavior exist that simultaneously incorporate both innate and contextual precursors of political attitudes. Rather, the extant literature was built upon Converse's (1964) framework which pitted psychological consistency—attitudinal consistency derived from superordinate values—against socially constructed attitudinal dissemination—attitudinal consistency derived from permanent political coalitions with diverse independent policy objectives. In this view, the organization of attitudes is a function

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of sociological pressures, where political knowledge and ideological thinking is rare among the general public; the relationship between domestic and foreign policy domains is weak, suggesting political ideology is a multidimensional construct with little attitudinal consistency. By focusing on this competitive framework for the formation of political attitudes, Converse ignored the possibility that both processes could simultaneously affect the attitudes people endorse.

A great deal of research and revision to the understanding of ideology has occurred over the last five decades. Attitudinal constraint is greater than Converse (1964, 1971) suggested. Although the general public has depressingly little political knowledge, there does appear to be a coherent structure to the relationships between attitudinal dimensions which remain reasonably stable over time (Achen, 1975; Conover and Feldman, 1981, 1984; Duckitt, Wagner, du Plessis, & Birum, 2002; Stenner, 2005). Moreover, this has inspired a renewed interest in sources of psychological constraint evidenced by the numerous explorations of internal processes that are at the forefront of contemporary ideological research (Alford, Funk and Hibbing, 2005; Druckman and Lupia, 2000). In this vein, Jost et al. (2009) recently proposed a top-down/bottom-up theory of attitude formation that integrates the unconnected findings from disparate literatures into a single theoretical framework. The two processes disaggregate the impact of internal predispositions from the contextual components of ideological preferences and allow each process to independently influence the formation of ideological preferences. One of the central implications of this top-down/bottom-up model is that the different pathways to ideological development should result in differential correlations between the attitudinal dimensions depending on which process drives the relationship between the attitudes.

Here we further integrate the disparate literatures on attitude formation by merging approaches from the psychology, political science and behavioral genetics under one umbrella: namely Jost et al.'s (2009) top-down/bottom-up model. This model explicitly takes into consideration the proposition that political attitudes are multiply determined and as such are formed and maintained through myriad independent processes operating simultaneously. Specifically we offer a novel approach to the operationalization of top–down and bottom–up processes through the use of quantitative genetically modeling which disentangles the social (top-down) and genetic (bottom-up) pathways between different attitude dimensions.

The article proceeds first by summarizing Jost et al.'s (2009) top-down/bottom-up model and then elaborates further on the theory by including biometric variance decomposition to operationalize the model. We then describe the relationships between the ideological (attitudinal) dimensions within the top-down and bottom-up pathways. This is accomplished first by estimating a multidimensional confirmatory factor analysis of a wide array of political attitude items on a genetically informative population sample, followed by decomposing the ideological factors into genetic and environmental sources of variance. Building upon the variance decomposition, we estimate three multivariate genetic analyses that allow us to examine the relationship *within* the genetic and environmental components of the political attitude dimensions, thus simultaneously modeling the top-down and bottom-up pathways.[1]

[1]More specifically, we are looking at the correlations between the genetic components of the attitudinal dimensions and the correlations between the environmental components of the attitudinal dimensions. With the data available, we are unable to explore the possible relationships between the genetic and environmental components of the attitudinal dimensions.

The Top-Down/Bottom-Up Theory of Attitude Formation

Jost et al. (2009) identify two independent pathways that motivate people to hold specific political attitudes. The bottom-up pathway is a function of dispositional factors that exert stable influences on behavior both over time and across different situations, such as personality traits, cognitive styles, or motivational predispositions. Although these constructs differ across individuals, prior research has identified predictable patterns that increase the likelihood that people with higher levels of these predispositions will either hold liberal or conservative preferences across a range of ideological dimensions. This perspective has largely been pursued by personality and social psychologists (Caprara et al., 2006; Carney, Jost, Gosling, & Potter, 2008; Jost, Glaser, Kruglanski, & Sulloway, 2003, 2008; Van Hiel, Kossowska, & Mervielde, 2000) and more recently by an emerging group of political scientists (e.g., Fowler & Schreiber, 2008; Hatemi et al., 2011).

On the other hand, the top-down pathway captures the influence of the political environment on attitude formation. Within this pathway, preferences are conceived of as responses to environmental variables, such as exposure to political information disseminated by political elites and the constraints imposed by the immediate situation (Zaller, 1992). Accordingly, the political context alters the connections between the ideological dimensions by emphasizing partisan divisions on the central issues within the larger social and political environment.

However, only one exploratory study has examined the genetic and environmental structure of attitudes (Hatemi, McDermott, & Eaves, 2009). Here, using a hypothesis driven analysis, we build on this earlier exploratory analysis and incorporate it into Jost et al.'s (2009) top-down/bottom-up theory of political attitude formation. Little empirical research attempts to disentangle the dispositional and environmental components of political ideology. Most studies approach ideology from either a bottom-up or top-down perspective, thereby ignoring the possibility that psychological and attitudinal predispositions have at least some environmental causes or that most social constructs are influenced by genetic, neurological, or hormonal differences (McDermott, 2004). This lack of integration has become increasingly important due to the implications of the burgeoning scholarship exploring attitudes using behavioral genetic (Alford, Funk, & Hibbing, 2005; Bouchard & McGue, 1990; Eaves & Eysenck, 1974; Hatemi et al., 2011; Martin et al., 1986), neuroscientific (Amodio, Jost, Master, & Yee, 2007), psychophysiological (Oxley et al., 2008), and other neurobiological (McDermott, Tingley, Cowden, Frazzetto, & Johnson, 2009) approaches.

If top-down and bottom-up processes have a distinct impact on the relationship between ideological preferences in different attitudinal domains, we should observe different relationships between the attitudinal dimensions when we examine the relationships between the attitude factors at the genetic and environmental levels.

Integrating a Model of Ideological Formation into Biometric Variance Decomposition

The top-down/bottom-up theory explicitly suggests partitioning attitude relationships into independent pathways. Until recently political scientists simply did not have the data or methods available to simultaneously partition variance into discrete components that would correspond to the bottom-up and top-down pathways. Behavior genetic techniques make it possible to estimate the independent impact of environmental and genetic differences on the formation and maintenance of attitudes. That is, using genetically informative data enables us to partition the impact of genetic and environmental sources of variance and examine the relationships *between* the ideological dimensions at each level of analysis. This partitioning

provides a powerful tool for operationalizing Jost et al.'s (2009) top-down/bottom-up model, by estimating genetic (bottom-up) and environmental (e.g., elite messages—top-down) processes simultaneously.

Biometric variance decompositions in twin models partition sources of individual differences into three latent sources of variation (Medland & Hatemi, 2009): additive genetic effects (A), or influence of all genes through lead to the attitude, common environmental (C) effects or socialization influences shared by family members living in the same home, such as socioeconomic status, parental influence, and religion, and finally, unshared or unique environmental effects (E) such as personal experiences or random events that only one twin experiences.

Although Jost et al.'s (2009) top-down/bottom-up theory does not specifically characterize top-down and bottom-up influences as genetic and environmental pathways, the general thrust of the behavior-genetic classification is highly compatible with their approach. The additive genetic components are analogous to the bottom-up or psychological pathway. Additive genetic variance captures dispositional individual differences that motivate people to hold more liberal or conservative views. By contrast, top-down pathways influence attitudes through concerted socialization attempts (shared environmental influences) or personal experiences (unique environment). Shared experiences include within-the-family experiences, school, or the general historical setting. Importantly, individuals also have unique experiences that are not shared with other members of their family (or specifically their co-twin), such as, seeing the news on a particular day, reading a random article in the newspaper, or talking to people who provide unique perspectives. Both shared and unshared environmental influences alter a person's attitudes by exposing them to new external information. Below we elaborate on the top-down/bottom-up model operationalized in a behavior genetic framework.

The Top-Down Pathway: The Influence of Life Experiences on the Structure of Attitudes

Attitudes formed through top-down processes require individuals to integrate external information into their attitudes. Accordingly, the specific issue positions that citizens endorse are, in part, a result of which issues are politically salient and therefore depend on the contemporary environment. These top-down influences, driven by family, social background, political elites, and the media influence both the content of attitudes as well as the relationships between different attitudinal dimensions (Bartels, 2000; Hetherington, 2001, Iyengar, Peters, & Kinder, 1982). Learning about politics in school and talking about politics at home and with friends (shared between twins) undoubtedly shape an individual's attitudes.

The top-down pathway can be understood as the individual's reaction to the political context. Because partisan elites determine which issues their party will endorse or oppose, which subsequently filter down to an individual through social or familial influences, the partisan grouping of attitudes within the American political discourse should alter on the strength of the relationships between different attitudinal dimensions. Specifically these belief constructs are disseminated in “packages” (Converse, 1964). When the general public receives these packages of issues from the political parties, they integrate this new information into their existing attitude structures. Elite messages, however, do not necessarily reflect psychologically consistent attitudes that can be captured by a single motivational or underlying value structure (Converse, 1964). Rather the elite-driven discursive superstructure of ideological attitudes reflects the political deals necessary to maintain relative peace between the diverse interests within each of the parties. Accordingly,

because elite discourse drives the availability of information in a person's environment, we should observe strong correlations between the attitudinal dimensions that dominate this discussion (i.e., social and economic attitudes) and weaker correlations between the attitudinal dimensions that are only tangentially related to the partisan debate (i.e., foreign policy attitudes). Thus, the strength of the relationship between the specific attitudinal dimensions should increase as issue domains become more consistently partisan leading to increased correlations between these dimensions should also increase. As the ideological discussion in the United States tends to revolve around domestic issues, like social and economic policy (Campbell, Converse, Miller, & Stokes, 1960, Converse, 1964; Conover & Feldman, 1981, 1984; Jennings, 1992; Poole & Rosenthal, 1997), if we separate the bottom-up and top-down pathways to attitude formation, we would expect the relationship between social and economic attitudes to be found primarily in the top-down pathway.

On the other hand, relationships between issues that are less integrated into the general partisan framework should be much weaker at the environmental level. Foreign policy decisions are generally perceived as falling under the purview of the sitting president, and thus foreign policy foibles are attributed to the reigning party. As these events are idiosyncratic, neither party is able to consistently associate their preferred foreign policy with their ideological preferences. Because foreign policy debates are oftentimes distinct from discussions of domestic politics, the relationship between foreign policy attitudes and either social or economic attitudes should be only modestly related at the environmental level.

Within the biometrical models we estimate in this article, these influences should be captured primarily by the environmental variance components. While the national political climate will be constant for a given population, how people experience that climate and what information they receive is highly dependent on personal choice (unique environment) and familial experiences (common environment). That is, after the initial dissemination of partisan policy preferences in “packages,” people then parrot these issue preferences from their preferred party in the conversations they have about politics. Parents, siblings, or even the twins themselves are the fundamental sources of variance within one's social environment. Thus, partisan preferences espoused at the elite level that drive the national ideological climate and is mediated by one's immediate social context (Mutz, 2002).

The Bottom-up Pathway: The Influence of Stable Predispositions on the Structure of Attitudes

Individuals, however, are not simply slaves to their political environments. In most cases, the new issue positions disseminated by elites are congruent with an individual's existing ideological structure and thus do not require massive changes in their related attitudes. Occasionally, inconsistencies arise between partisan messages and an individual's ideological structure. When an individual's attitude towards a specific issue does not correspond with their party's policy platform, the personal relevance of the issue is quite important. An individual who feels strongly about an issue that is inconsistent with their party's platform is likely to change their partisan affiliation. Alternatively, if the issue is not seen as personally important, the individual will simply adjust their position on the issue to correspond with their partisan affiliation (Carsey & Layman, 2006).

Given that bottom-up processes are rooted in innate psychological mechanisms, the relationship between attitudes formed through bottom-up processes should not necessarily correspond with those formed through top-down processes and should be relatively unaffected by the important issues of the day or the partisan packages that comprise the elite political discourse. Accordingly, current research exploring the bottom-up pathway ignores

the partisan nature of attitude formation and focuses on the relationship between attitudes and other factors that have a known bottom-up component, such as personality traits & cognitive styles (Druckman & Lupia, 2000; McGue, Bacon, & Lykken, 2003).

For example, the personality and politics literature has demonstrated that different ideological dimensions are related to specific personality traits. Liberal social ideological attitudes correlate positively with openness to experience at a higher level than economic ideological attitudes openness to experience (Carney et al., 2008; Gerber, Huber, Doherty, Dowling, & Ha, 2010). By contrast, the reverse is true for the pattern of relationships between conscientiousness and social and economic ideology with higher levels of conscientiousness associated with the endorsement of social and economic conservative beliefs (Carney et al., 2008; Mondak & Halperin, 2008; Van Hiel et al., 2000; Van Hiel & Mervielde, 2000). In addition, liberal economic attitudes correlate positively with neuroticism (Verhulst, Hatemi, & Martin, 2010) or emotional instability (Gerber et al., 2010) while social attitudes do not appear to correlate with this personality trait. Therefore, although some of these psychological or bottom-up processes are consistent between social and economic attitudes suggesting some sort of a relationship between these dimensions at the additive genetic level, the differential magnitude of the relationships with these attitudinal dimensions and other variables suggest that the size of the relationship from a bottom-up perspective would be limited.

Alternatively, Eysenck's P-scale (a blend of authoritarianism and militarism) is positively correlated with social ideology and military ideology, but completely orthogonal to economic ideology (Verhulst et al., 2010). Indeed, authoritarianism has long been associated with social ideological issues (like the fixation with sexual deviancy and the importance of moral values in politics) and attitudes towards aggression and war (Adorno et al., 1950; Altemeyer, 1982, 1996; Feldman, 2003; Stenner, 2005). Thus, we should observe a strong relationship between social and military ideology as a function of shared bottom-up processes that drive both attitudinal dimensions.

One interpretation of the finding that different personality traits and individual differences are correlated with specific ideological dimensions is that different motivational states and value orientations underscore different ideological tendencies. This suggests the relationship between attitudes are, in part, a function of bottom-up processes that should correspond with the inherent relationships between the motivational underpinnings that lead to the formation of the ideological dimensions. However, research has only begun to explore the genetic underpinnings of political preferences, and the relationships between specific *genetic components* of political ideology remain understudied (for an exception, see Hatemi et al., 2009). As such, our hypotheses regarding the genetic the structure of attitudes at the genetic level is to some degree exploratory.

Hypotheses

Based upon the literature discussed above, and in combination with Jost et al.'s (2009) top-down/bottom-up theory, we derive several hypotheses. Because the political discourse is dominated by discussion of social and economic policies which are integrated by the media and partisan elites into ideological packages, the top-down pathway should demonstrate a strong correspondence between the social and economic attitudes and a weaker relationship with military attitudes dimension. From a bottom-up perspective, the internal motivations that drive individuals to endorse socially and morally conservative policies drive them to support conservative military policies as well. This tendency, however, may not correspond with the innate tendency to support economically conservative attitudes.

Methods

Our analysis proceeds in four stages. In the first stage, we estimate a confirmatory factor model of political attitudes to identify the major ideological dimensions. In doing so, we estimate the correlations between three prominent ideological dimensions (Social, Economic, and Military/Defense). In the second stage, using a classical twin design, we estimate genetic and environmental sources of variance on each of the attitude *dimensions*. In the third stage, we examine correlations between each of the attitudinal dimensions at the additive genetic, shared environmental, and unique environmental levels (Cholesky decomposition). In this way we engage Jost et al.'s (2009) top-down/bottom-up model of attitudinal formation by providing an estimate of how ideological factors are related at both the environmental (top-down) and genetic (bottom-up) pathways. Next, we estimate an Independent Pathways model, which is simply a special type of CFA model, to examine the extent that the attitudinal factors load differently on the latent genetic and environmental factors, allowing us to examine whether the attitudes have the same factor structure at the genetic and environmental levels. This model differs from the phenotypic CFA model estimated in the first stage as the independent pathways model allows the genetic and environmental components to independently contribute to the general phenotypic variance. Thus, while we have assumed a three-dimensional structure at the phenotypic level, it is not necessarily true that the same structure will be observed at the additive genetic, common environmental, and unique environmental levels. To properly test the differential structure of attitudes at the genetic and environmental levels, we compare the model fit for the independent pathways model to a common pathways model that forces the attitudinal structure to be equivalent at the genetic and environmental levels.

Sample

A Health and Lifestyle Questionnaire, consisting of a range of public health issues, which fortuitously also assessed political and social attitudes measured by a Wilson-Patterson type of attitude index, was conducted in the late 1980s. The full sample consists of 29,682 individuals from 8,636 independent families drawn from the Mid-Atlantic Twin Registry (MATR), which comprised approximately 40% of the sample. Sample size was increased by simultaneously sending a national mail-back questionnaire to the members of the American Association of Retired Persons (AARP) to account for the remainder of the sample. For the purposes of the current study, we focus exclusively on the subsample of 14,751 twins. The response rate for the twins was 70% (Truett et al., 1994).[2] Because one sample was drawn from the Mid-Atlantic region consisting primarily of twins from Virginia, North Carolina, and South Carolina and the other sample was taken from the AARP, which has a mean age older than the general population, both groups favored slightly more political conservative attitudes; however we do not expect this general conservative tendency to influence the relationships between the attitude items. The basic demographic information for the twin sample is presented in Table 1.

Attitude Items

As political ideology has a multifaceted structure (Conover & Feldman, 1981, 1984; McClosky & Zaller, 1982; Treier & Hillygus, 2009), we constructed attitudinal dimensions that loosely reflected the classic social, fiscal, and foreign policy ideological dimensions of the American electorate. As the majority of the items on the questionnaire are completely irrelevant for the current study, we focus exclusively on the political attitude items. The question wording and complete attitude battery are presented in the online Appendix A. In constructing the attitudinal dimensions, we excluded items that were not explicitly political

[2]More details on the ascertainment and other metrics are reported elsewhere in the literature (Eaves et al., 1999; Lake et al., 2000)

or that did not fit into one of the three ideological dimensions. For the ideological dimensions higher scores indicate more conservative attitudes.

Results

Figure 1 presents the standardized factor loadings for the three ideological dimensions as well as the residual variances of each of manifest indicator. The CFA model fits the data fairly well, given the RMSEA of 0.063, CFI = 0.928, and TLI = 0.938. This factor structure is highly consistent with the existing expectations regarding the structure of political attitudes in American politics.

The first dimension corresponds with a social or moral ideology dimension commonly discussed in the political ideology literature (Campbell et al., 1960; Converse, 1964; Conover and Feldman, 1984; Gerber et al., 2010). This dimension is identified by strong loadings for attitudes toward gay rights, women's rights, and abortion. Importantly, religious attitudes also load strongly on this factor with school prayer, moral majority, and living together acting as reasonably strong indicators of the social ideology dimension. The economic-attitudes dimension consists of attitudes toward immigration, foreign aid, capitalism, federal spending on housing, and property taxes, all of which have an economic component that serves as the latent basis for this factor. Since the 1950s, this factor has consistently emerged as a second factor along which political attitudes can be discriminated. The military-attitudes dimension is identified by high loadings for “the draft,” “military drillm” and “nuclear power.” As these constructs are inextricably tied to the military and national defense, this label seems obvious. In general, these latent attitudinal factors correspond with the ideological dimensions discussed in the existing literature.

Relationships between the Attitude Dimensions

Figure 1 also presents the correlations between the latent ideological dimensions. There is a very strong relationship between the social and economic ideology dimensions (r = 0.499), consistent with the existing literature (Conover & Feldman, 1984). In comparison, there is a modest correlation between social and military attitudes and a weak negative correlation between economic and military attitudes (r = − 0.117).

However, the phenotypic (general attitudinal) correlations between the attitude dimensions conflate top-down and bottom-up explanations of ideological structure. Essentially, focusing only on these phenotypic relationships would make it impossible to disentangle whether top-down or bottom-up processes are driving the correlations between the ideological dimensions. To investigate the extent each process is driving the relationship between factors, we decompose covariance *between* the attitudinal dimensions into additive genetic, shared, and unshared environmental components. In doing so, we can examine the relationships between each separate variance component to identify which process (top-down/bottom-up) is occurring.

Genetic-variance components analysis leverages the biometrically established genetic relationships between monozygotic (MZ) and dizygotic (DZ) twins and enables us to compare the covariation between the two types of twins: MZ twins are twice as genetically similar as DZ twins. It follows that if an attitude is a function of additive genetic variance, the correlation between MZ twins should be twice as large as DZ twins. Alternatively, if an attitude is primarily a function of parental socialization and shared environmental influences, the correlation between MZ and DZ twins would be the same, as genetic differences between the twins do not play a role in the development of the attitude. As MZ twin pairs become increasingly more similar to each other than DZ twin pairs, the proportion of the variance that is attributed to genetic variance increases.[3] Table 2 provides the results

from the univariate variance decomposition of the ideological dimensions into three separate sources of variance: additive genetic (A), common environment (C), and unique environment (E). The OpenMx statistical package (Boker et al., in press) was used for maximum likelihood estimation of the three components (ACE) common to the classical twin design.

Consistent with the extant literature on U.S. and Australian populations (Eaves et al., 1999; Verhulst et al., 2010), all three attitude dimensions have sizeable additive genetic components, suggesting a large role for bottom-up processes. There are also modest to substantial common environmental components of the social and economic attitude dimensions suggesting a role for top-down processes in these attitude dimensions as well. However, in the military dimension, the common environmental variance is not statistically significant, suggesting that the impact of common environmental factors in military attitudes is not prevalent. Thus, we will not elaborate on the common environmental factor in all further analyses of the military-attitude factor.

Multivariate Genetic Analysis

In the next stage of our analysis, we separate the total covariance between the attitude dimensions and examine whether the phenotypic covariance is a function of shared genetic or shared environmental factors. Broadly, this is referred to as a Cholesky Decomposition (Loehlin, 1996). Similar to an exploratory factor analysis, a Cholesky decomposition is a structural equation model where there are as many parameters as there are observed statistics (means, variances, and covariances). Similar to the univariate case described above, this analysis leverages the differential covariation between different attitudinal dimensions across the two types of twins. Thus, if the covariance between two attitudinal dimensions is twice as large in MZ relative to DZ twins, it can be inferred that the relationship between the two attitudinal dimensions is primarily a function of shared genetic variation and not common environmental variation. By contrast, if there are no differences in the magnitude of covariance between MZ and DZ twins, the relationship between the

In general, the ordering of variables in a Cholesky should be based on theoretical expectations regarding the order of causality between two or more constructs as the parameter estimates will changes as a function of the order variables are entered into the model (see Loehlin, 1996). In this study, because we are not interested in the causal ordering of the attitudinal dimensions, we use a simple mathematical transformation of the parameter estimates to retrieve the correlations between the attitudinal dimensions for each variance component. Importantly, these correlations simply describe the relationship between the attitudinal dimensions at each level of variance and do not take into account whether the source of variance contributes meaningfully to variance in the attitude.

Table 3 presents the genetic and environmental correlations between the shared environmental components of the three attitudinal dimensions. As can be seen in the table, there is support for our hypothesis that there is a strong shared environmental relationship between the social and economic ideological dimensions. Specifically, the shared environmental variance correlation between the social and economic ideological dimensions was greater than 0.90, suggesting that the same environmental influences that drive people to develop socially conservative attitudes also motivate them to develop economically conservative attitudes.[4]

[3]For a detailed explanation of the methodology and theory, along with limitations and criticisms, see Medland and Hatemi (2009)
[4]The shared environmental component of the military attitudes dimension was negligible, and as such, the correlations between the military attitudes and the other attitudinal dimensions are substantively irrelevant.

A somewhat similar story emerges for relationships between the additive genetic components of the ideological dimensions. First, we also find a strong relationship between social and economic attitudes at the additive genetic level ($r_{genetic}$=.599), as well as a strong relationship between additive genetic components of the relationship between military and social ideology ($r_{genetic}$ = 0.405). Importantly, these correlations are substantially smaller than the correlations observed at the common environmental level. It appears that the same bottom-up processes that drive people to develop socially conservative attitudes also drive them to develop conservative military attitudes. Although we do not specify the specific motivations that drive these processes, it seems intuitive that some moral or norm-defending motivations may be at play for both processes. However, the relationship between the additive genetic components of economic and military ideological dimensions is paradoxically negative ($r_{genetic}$ = −0.141), though statistically insignificant, suggesting relative independence between these dimensions at the genetic level.

Finally, before examining the relationships between attitudinal factors at the unique environmental level, a caveat is necessary. Unique environmental variance captures both the unique experiences that are not shared between twins as well as stochastic and systematic *error* variance. Thus, we interpret the relationships between unique environmental influences with extreme caution. Given this caution, the unique environmental relationship between the social and economic ideological dimensions is also quite strong (r_{unique} = 0.457). Thus, the random events in a person's life lead them to endorse both social and economically ideological preferences that appear to be the same experiences. By contrast, the unique environment is relatively unimportant for *the relationship between* social and military attitudes (r_{unique} = 0.187). As such, unshared experiences do not seem to drive the relationship between these dimensions to a large extent. Finally, the relationship between economic and military attitudes is again negative at the unique environmental level (r_{unique} = −0.300). Accordingly, the unshared environment appears to drive economic and military attitudes in opposite directions.

Fitting the Best Model: Testing if the Genetic and Environmental Factors are Equivalent

The question now turns to how to best capture the various relationships that exist between the attitudinal factors at the genetic and environmental levels. The Cholesky decomposition described above is a completely saturated model which provides a description of the data, analogous to a matrix of product-moment correlations. To explore the differential impact of the top-down and bottom-up pathways to attitudinal development, we respecified the model to test specific hypotheses about the structure of the relationships between the attitudinal dimensions. Specifically, we test two nested models: the Independent Pathway model (IPM) and the Common Pathways Model (CPM). Each model implies a specific set of hypotheses. The IPM is analogous to three independent single-factor CFA models that test the structure of the genetic and environmental covariation between the three attitudinal dimensions. This model assumes that the latent genetic and environmental factors are *independent,* which is consistent with the top-down/bottom-up theoretical framework we detailed above. More succinctly, the IPM allows the structure of the relationships between the attitudinal dimensions to vary between the genetic and environmental levels, suggesting the relationships between the attitudes are the result of different attitude-formation processes. Figure 2 presents the IPM estimates for the three attitudinal dimensions.

Alternatively, the CPM, presented in Figure 3, forces the attitudinal factors to load on a single latent ideology factor and is only then decomposed into genetic and environmental variance. This model implies that the structure of attitudes is the *same* at each level of variance.[5]

Because the Common Pathways model (CPM) is nested within the Independent Pathways model (IPM), a simple likelihood ratio test can be used to test the comparative fit of the two models. The likelihood ratio test confirms that the IPM model fit the data significantly better than the CPM ($\chi^2 = 2263.37$, $p < 0.001$). Therefore, we conclude that the structure of attitudes is significantly different at the genetic and environmental levels. The social and military dimensions load strongly on the genetic factor, while the loading for the economic dimension is markedly weaker. Notably, the residual additive genetic variance for the economic factor is quite large, whereas the residual for the social and military factors are zero, suggesting the genetic variance in economic attitudes is distinct from the additive genetic variance in military and social attitudes.

For the common environmental factor, by contrast, the two predominant loadings are for the social and economic attitudinal dimensions, and the loading for the military attitudes dimension is quite weak. This is not overly surprising as military attitudes do not have a significant common environmental variance component. Importantly, the latent common environmental factor captures virtually all of the common environmental variance from the economic attitudes dimension and what little common environmental variance that exists in the military attitudes dimension, leaving only a small amount of residual social attitudes not accounted for by the general common environment factor.

Finally, the unique environmental structure is again completely different. Essentially, each attitudinal dimension has a unique factor, with minimal overlap between the dimensions. In other words, the unique experiences that lead someone to be more liberal in one domain are, by and large, independent of those that lead them to be liberal in another domain. Because economic attitudes dominate the latent unique environmental factor, and the residual loadings of the military and social attitudes are relatively large, we conclude that the unique environmental factor components of the three attitudinal dimensions are largely independent. The results from the IPM suggest the structure of attitudes is different depending on whether the attitudes are a function of genetic or environmental variance.

Discussion

Here, we provide an exploration of ideological structure of attitudes by simultaneously estimating genetic and environmental influences on political attitudes that correspond with top-down and bottom-up pathways for attitude formation. These results provide empirical support for Jost et al.'s (2009) theoretical proposition that two distinct pathways influence the attitudes people hold. Our findings suggest that the development of political attitudes is remarkably different at the genetic level relative to the shared and unshared environmental levels of analysis.

Consistent with the extant literature in political science, the common environmental factor is dominated by the relationship between social and economic attitudes. Socialization experiences in environment increase the relationship between an individual's economic attitudes and their social attitudes. This finding is consistent with Converse's argument that partisan elites disseminate “packages” of policy preferences with little need for psychological coherence between the issues domains. Alternatively, military attitudes do not play an important role for the common environmental factor as military attitudes do not have a significant common environmental component.

[5]Social attitudes are clearly the predominant component of the general ideology factor, as indicated by the very strong pathway between the latent ideology factor and the social attitudes dimension and the virtually nonexistent residuals for the social attitudes factor. By contrast, the economic dimension has a smaller loading on the general ideology factor, with sizable residual genetic and environmental. Similarly, the military attitudes load significantly, though notably weaker than the other two attitudinal dimensions, on the general ideology factor, with sizeable residual variance components.

The genetic relationship between attitude dimensions is primarily found between social and military attitudes which suggest the dispositional motivations to form socially conservative ideological preferences also motivates people for conservative military attitudes. This is not meant to imply that economic attitudes do not have a genetic component, but rather that the genetic component of the economic attitudes is distinct from the genetic components of the social and military attitudes. As such, this result emphasizes the greater importance of bottom-up processes in the relationship between military attitudes and social ideology and suggests that common motivational processes may underscore this relationship.

These results add further support to the multidimensional conceptualization of ideology and question the use of an overarching unidimensional ideology factor (e.g., Conover & Feldman, 1984; Treier & Hillygus, 2009). Moreover, the current findings suggest ideology exists in different forms at different levels of analysis. Political ideology is not a unitary construct with a single set of antecedents, but rather a complex, multidimensional construct that is the product of several independent and intersecting processes. Accordingly, to understand the formation of political ideology, it is necessary to disaggregate the construct into several different components and explore those individual components.

Limitations

Biometric variance decomposition is relatively new to political science, unlike regression models, and it useful to discuss some of the statistical assumptions.[6] First, twin modeling assumes that MZ and DZ twins raised in the same homes experience equally similar environments with regards to influence on the trait of interest. If MZ twins are treated more similarly than DZ twins, and this similarity influences the attitudes MZ twins express, then heritability estimates will be *overestimated,* and the environmental estimates will be underestimated. While it is well known that identical twins are more likely to share rooms and to be dressed alike as children, longitudinal (Hatemi et al., 2009) and adult (Smith et al., 2010) studies which explored the potential for unequal environments on political attitudes found no evidence of a special MZ environmental influence.

Second, twin-only models assume random mating (or in this case, people do not decide who to marry based on their potential partner's political attitudes). If attitudes are heritable and people choose spouses with similar attitudes, then DZ twins will share more than half of their genes (because the genes from their mother and father will be correlated), and therefore heritability would be *underestimated,* and environmental factors would be overestimated. This assumption has been shown to be more important for political attitudes, as spouses tend to express similar attitudes (Alford et al., forthcoming). This poses an important direction to explore in future applications of the model.

Third, twin-only models estimate genetic and environmental components of political attitudes as independent and do not account for instances when people with specific genotypes seek out specific environments that allow them to express those attitudes more readily (i.e., gene-environment covariation) or for instances where the environment moderates genetic expression (i.e., gene-environment interaction). More advanced models are necessary to further explore gene-environment interplay.

Finally, similar to all other kinship studies, the sample is not random, and it is premature to make a definitive generalization. Replicating the findings on additional population samples is required.

[6]For more information on the assumptions of the classic twin models, see Keller et al. (2009)

Conclusion

In this article, we offer an initial behavioral genetic operationalization of Jost et al.'s (2009) top-down/bottom-up theory of attitudinal development. Consistent with the theory, we find a specific role for both top-down (political socialization) pathways to the formation of political ideology that integrates elements of the contemporary political discourse into an individual's attitudes, as well as a specific role for bottom-up (dispositional) processes in the formation and maintenance of political attitudes.

The results suggest that the development of, and relationship between, political attitude dimensions differ at different levels of analysis, be it environmental or innate. Specifically, at the common environmental level, the structure of attitudes is consistent with the sociological model of attitude formation that suggests partisan rhetoric exaggerates the consistency between the social and economic ideological preferences. Thus, because the Democratic Party is both socially and economically liberal, and the reverse for the Republican Party, the partisan messages they send are consistent across the social and economic ideological domains, and this consistency can only be captured at the common environmental level. Alternatively, at the additive genetic level, the consistency between the social and military dimensions is notable. Thus it appears that the ideological structure at the additive genetic level is not constrained by the partisan induced consistency between the social and economic dimensions. Instead, the economic ideological attitudes remain distinct from social and military attitudes.

The development, maintenance, and consistency of attitudes have long been central to the study of political behaviors and are matters of great debate. The public has been found to have attitudes and nonattitudes, to be consistent and inconsistent, to have constraint and lack constraint, to have a unidimensional worldview and to have no worldview at all. There is little agreement over the last 50 years of exactly what ideology is and how attitudes are structured, developed, and maintained. The current findings here add to the growing support for the proposition that to properly understand political ideology, both dispositional and environmental factors must be taken into consideration (Hatemi et al., 2009; Jost et al., 2008). Rather than suggesting that one pathway is relatively more important than the other, our results suggest that both pathways are integral to understanding why people hold the specific attitudes they hold. Indeed, as elite discourse changes and times change, both social and dispositional influences on relationship between attitudes will change. Hence, in order to accurately comprehend political ideology, we must understand processes at both levels.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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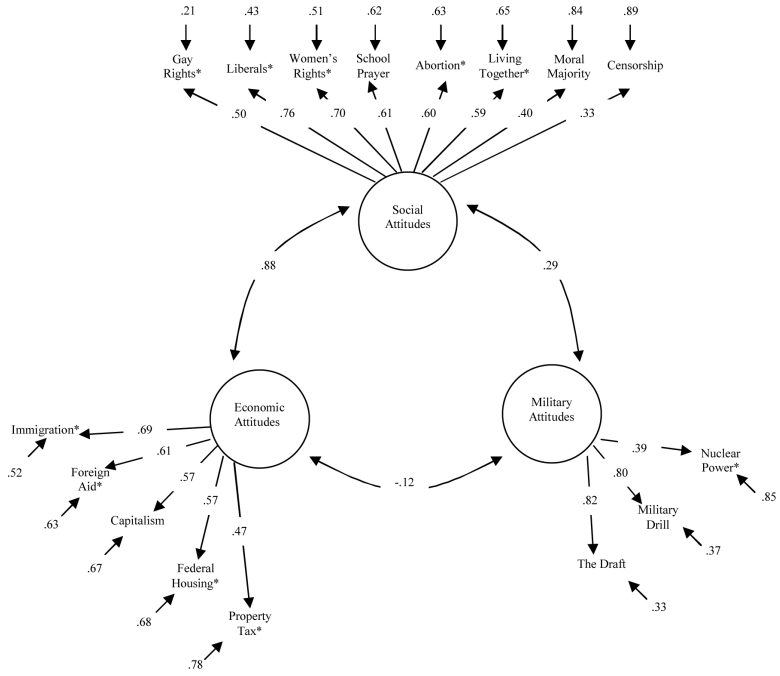

Figure 1.

Standardized Confirmatory factor loadings for the ideological dimensions
CFI = 0.928, TLI = 0.938, RMSEA = 0.063

Note: The items with asterisk were recoded to load positively on the traits prior to the analysis. Higher scores on the factor are more conservative. In the analysis, there were 12,088 individuals nested within 6,046 families.

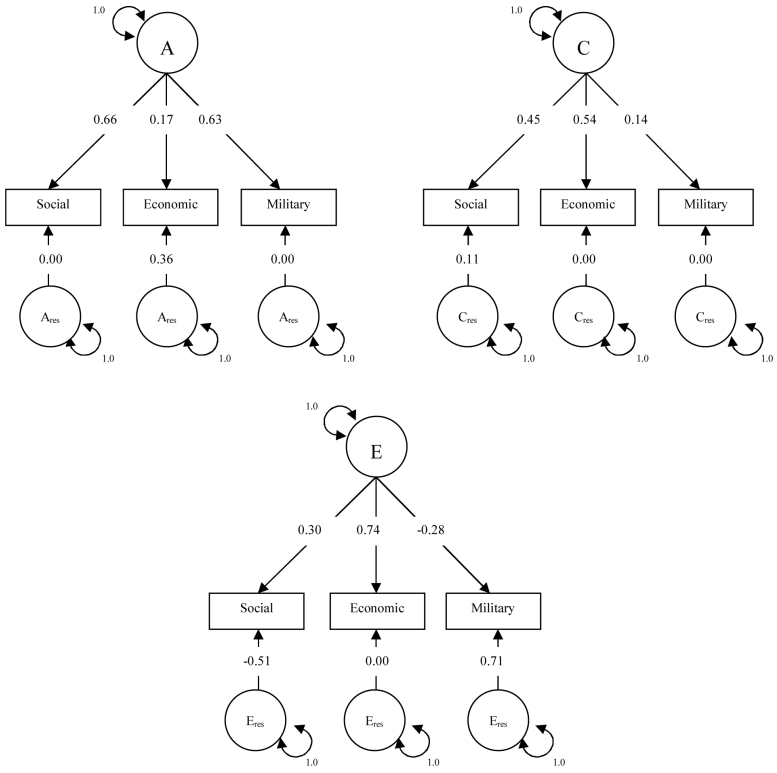

Figure 2.
Independent Pathways Model
Log Likelihood = −21368.12
Note: The coefficients presented in the Figure are standardized path coefficients. In the analysis, there were 12,088 individuals nested within 6,046 families.

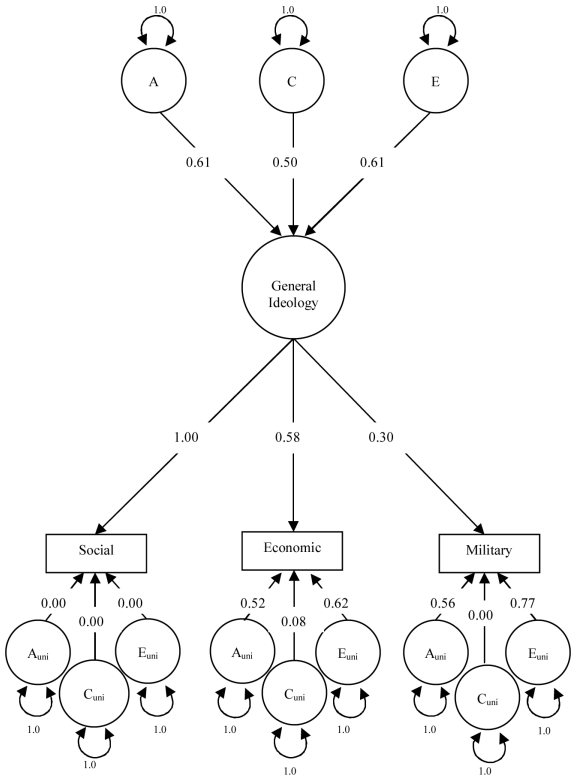

Figure 3.

The Common Pathways Model

Log Likelihood = −22499.81

Note: The coefficients presented in the Figure are standardized path coefficients. In the analysis, there were 12,088 individuals nested within 6,046 families.

Table 1

Basic Demographic information for the Twin Sample

Monozygotic Twins	46.00%
Female	63.94%
Education	
Did not complete HS	13.29%
Completed HS	33.37%
Some College	25.74%
Completed College	27.60%
Marital Status	
Single	16.62%
Married/Living Together	66.11%
Widowed	9.84%
Separated/Divorced	7.43%
Age	51.09 (SD =18.60)
Income	
Twins Annual Income	$10,000 – $14,999
Total Annual Family Income	$20,000 – $24,999
Number of Individual Twins	12,088
Number of Twin Pairs	6,074

Table 2

Variance Decompositions for Military, Social and Economic Attitude Dimensions (confidence bounds in parentheses)

	a^2	c^2	e^2
Social	**0.373** (.31, .43)	**0.253** (.20, .31)	**0.373** (.35, .40)
Economic	**0.430** (.35, .51)	**0.098** (.03,. 16)	**0.472** (.45, .50)
Military	**0.392** (.30, .42)	**0.001** (.00, .07)	**0.607** (.58, .64)

Note: In each model there were 12,088 individuals nested within 6,046 families.

Table 3

Correlations between the specific variance components for Same Sex Twins (confidence bounds in parentheses)

		Correlations between the specific variance component		
		1.	2.	3.
Additive Genetic	1. Social	–		
	2. Economic	**0.599** (.51, .68)	–	
	3. Military	**0.405** (.28, .53)	**−0.141** (−.25, .00)	–
		1.	2.	3.
Shared Environment	1. Social	–		
	2. Economic	**0.971** (.78, 1.0)	–	
	3. Military	**0.992** (.41, 1.0)	**0.932** (−.03, 1.0)	–
		1.	2.	3.
Unique Environment	1. Social	–		
	2. Economic	**0.457** (.43, .49)	–	
	3. Military	**0.187** (.15, .22)	**−0.300** (−.33, −.27)	–

Note: There were 12,088 individuals nested within 6,046 families.